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Agriculture.

ABOUT MANURES.

Farmyard manure is generally regarded by farmers as a "complete fertiliser." In one sense this is so, but only in so far as it contains all three of the fertiliser ingredients; but these ingredients do not exist therein in the proportions required by most crops. For instance, it contains proportionately too much nitrogen, and not enough phosphoric acid and potash to entitle it to be considered a complete fertiliser. Now, a manure containing an excess of nitrogen will unduly increase the growth of leaf and straw at the expense of tubers, fruit, or grain. Therefore, in order to avoid such a result, stable manure should always be supplemented with artificial fertilisers containing phosphoric acid and potash. Stable manure will certainly lose a portion of its nitrogen, in the form of volatile ammonia, when allowed to decompose by exposure to the air. This loss can, however, be prevented by scattering kainit over the surface of the manure heap as it accumulates. The amount of kainit which should be added to fresh stable manure to prevent loss of ammonia through heating is 1 lb. per day for each cow or horse, or for eight head of sheep. The kainit will save more than its cost in the value of the nitrogen which it retains, and will possess its original value as a potash food.

Amongst artificial manures muriate of potash is the cheapest form of potash. It is the best source of potash, except in special cases where chlorine may injure the quality of the crop, and should not be used for tobacco or oranges. For these crops sulphate of potash or sulphate of potash magnesia should be used. Kainit is another form of potash salt, containing chlorine, and is especially valuable upon sandy soils. It is valued not only for its fertilising properties, but also for its power of destroying insect life and curing plant disease. It is a most valuable fertiliser for a cotton crop. Wood ashes are also a valuable source of potash, but the amount is small and variable.

The most important materials supplying nitrogen which are largely used in the composition of commercial fertilisers are the following:—Nitrate of soda and sulphate of ammonia, in which the nitrogen is in a soluble or available form. Nitrate of soda is particularly adapted for top dressing during the growing season, and is the quickest-acting nitrogenous fertiliser. Dried blood, fish scrap, and cotton-seed meal represent a form of nitrogenous fertiliser in which the nitrogen is more slowly available. These substances, if used, must therefore be applied early to produce the best effects.

There is no need to apply these nitrogenous fertilisers to peas, beans, lucerne, vetches, &c., because their plants derive their nitrogen from the air. Only potash and phosphoric acid need be applied to them.

This brings us to the matter of green manuring, and every advantage should be taken of this property of collecting nitrogen by leguminous crops to obtain from them a portion (and sometimes even all) of the nitrogen required for other crops. If ploughed under, the legumes will not only furnish nitrogen to the soil, but also humus, which improves its physical condition. This is what results from green manuring if rationally carried out. The heavier the growth of, say, a crop of cow-peas or velvet beans the larger will be the amount of valuable nitrogen which it will gather. A rank growth can be obtained on the poorest soils by the liberal use of phosphoric acid and potash.

In a hot climate and on sandy land it is not advisable to plough under a heavy growth of these plants while in a green condition. If the soil is very deficient in vegetable matter, the crop should be allowed to die upon the land, and only be ploughed under in cool weather. If, however, it is necessary

to plough under a green crop, a good dressing of lime—not less than 30 bushels per acre—should be applied to prevent injurious souring of the land.

Where the soil is fairly well supplied with vegetable matter it is not economical to plough under the entire growth of a crop of cow-peas, since the feeding value of such crop is greater than its value as a fertiliser.

It should be borne in mind, in connection with green manuring, that, if long-continued dry weather ensues after ploughing-in a heavy green crop on a light soil, more harm than good will result, because the plants will not rot, the moisture will evaporate rapidly from the soil which has been rendered more open by the buried plants, and then the only hope of getting a succeeding crop is by careful harrowing, rolling, and cultivation of the surface. Green manure sometimes acts very slowly. The inorganic matters and the nitrogen in the buried plants are not all consumed by the living crop, because the dead ones have not completely rotted, so that something will be left to assist a second crop. In any case, time must be given to the buried plants to be destroyed; otherwise destruction may overtake the next crop sown.

ASPARAGUS CULTURE.

By C. E. B. WELSH, F.R.H.S.

Respecting the recent article in the April issue of the "Queensland Agricultural Journal," on Asparagus, the following addition may prove useful to intending growers:—

Asparagus officinalis is a member of the Liliaceæ tribe, being in the same group as the Lily of the Valley, Solomon's Seal, but these, unlike other members of the Lily tribe, have no bulbous roots. Asparagus is a branching herbaceous plant with scaly stems and bristle-like leaves, and creeping roots filled with a milky matter, even when in their dormant state in winter, which makes them very susceptible to injury from being exposed to drying winds and sun, which dries these roots up and renders them lifeless; in transplanting, therefore, great care should be taken to prevent exposure to the air, in fact, it is essential for the best success. If possible, transplant in the early morning or evening. Dull weather is the ideal time, but unfortunately for market growers, ideal weather does not often come when desired, and operations have to be carried out as time and circumstances permit.

The French gardeners are adepts at the art of asparagus culture, and send a large supply to the English markets. In England one has to go to the Vale of Evesham, Worcestershire, to see it grown in quantity. There, hundreds of acres are devoted to it. For many years it has been grown in beds, but, during the last few years, new asparagus areas have been planted in rows, because beds require all hand labour. In Queensland, where labour is difficult to obtain and costly, it seems to me growing asparagus in rows is the only practical method for the market gardener, and I will proceed to describe it.

In its native haunts, in England and Europe, the asparagus is found growing in a sandy soil, sometimes pure sand, along the coasts. For this reason it does best near the coast. In Southern Queensland, on the coast line, many such like places could be found making a most favourable site for asparagus cultivation; therefore, choose a sandy soil near the coast. The preparation of the soil is very simple, but it must be done thoroughly. First of all, plough the land all over very deeply; if three horses can be used, all the better. Then cross plough and harrow; then proceed to mark out the rows 4 ft. apart in this way. With a strong horse, and using a plough with a wide mould board, plough open a furrow the full length of the row, then turn, enter furrow and split, which leaves a wide open double furrow. Then turn the horse in again and break up the subsoil. After this has been carried out, the ground can be left in this state for a week or so to sweeten the subsoil

by exposure to the air. After this has taken place, procure some ¼.in. bones, horse-hoof parings, basic slag, and scatter along in the open furrow, using about 5 lb. of each to 1 chain length. Then, with the horse cultivator work this into the soil. Now obtain some cow manure and spread in the open furrow fairly thick, after which, with the plough, gather the top soil on to the cow manure. The ground is then ready for planting the roots or sowing the seed. Should the latter be preferred or be more convenient, leave till August, then drill in the seed, but the planting of roots is best carried out in July. If the roots are purchased or obtained from a distance, when they come to hand plunge them into damp sand and keep moist until the grower is ready to plant. They will keep like this without injury. On a suitable day take a light 6-in. plough and plough out a single furrow 6 in. deep up the rows previously manured. Then take the asparagus roots out of the damp sand, a few at a time as required for immediate use, and place them at the bottom of the furrow, 18 in. apart, taking care to spread out the roots. While one is planting the roots another should be just behind drawing the soil over them and filling in the furrow with a hoe or other convenient tool. Great care must be exercised in handling roots not to break them or they will bleed, being very brittle. The crowns—that is, the top of the roots—should not be less than 4 or 5 in. below the surface of the ground. The varieties to select from are Connover's Colossal, Giant Argenteuil, Covent Garden, and Palmetto. The after cultivation of asparagus consists in keeping it free from weeds. As soon as the buds show through the soil, hand-hoe carefully the rows, and run the cultivator down the middle. I advise planting asparagus in rows 4 ft. apart, as this distance enables the land to be worked more easily, and also because, during the winter, peas and beans can be grown between—a single row between the asparagus, which is dormant during the winter, so the peas and beans do not rob the asparagus of moisture, and also plants of the leguminous tribe will enrich the soil with nitrogen if the roots are left in the ground. Manure the peas and beans with a little superphosphate and sulphate of potash. No buds must be cut during the first year, only a few the second, more the third, and full the fourth. The cutting season lasts six to eight weeks, and should not be prolonged, because the crowns will be weakened for next year. Just before the buds begin to shoot up, it is a good plan to run the Planet Junior plough up between the rows, throwing the soil on to the rows and moulding them up. This makes a nice loose loamy ridge for the buds to come through, and then, just as they show 1 in. above the soil, they may be cut with a nice bleached stem, which is so much admired, and there is no danger of injuring the crown in cutting as without moulding up. Practical asparagus growers use for cutting the buds a round rod about 12 in. long, the end of which is flattened out and divided into teeth; this end is pushed into the soil at an angle of 45 degrees under the bud to be cut. With this tool there is no danger of cutting other buds just coming up under the soil. In England the usual plan is to allow the very small buds, which are called "prue," to grow up into "bower," which is cut and sent to Covent Garden, where it brings in good returns, as it comes at a time when out-door green foliage for decorating purposes is scarce. In Queensland there might prove to be a limited demand for it. Too much stress cannot be laid upon waiting three years after planting before full cutting, and not to cut too far into the growing period. The asparagus belongs to the class of plants which store up food and energy during the growing period wherewith to start into activity in the spring after their dormant state in the winter. It is a great mistake to prolong the cutting of the buds over six or eight weeks, as it shortens the time for the roots to form fresh crowns and recoup their strength for the next cutting season. Some growers in England plant supernumerary rows between the permanent rows, and cut from these supernumerary rows the first two years and then plough out. This plan brings returns

in quicker and saves cutting from the permanent rows too early; but this method hardly pays for the extra labour involved, and I think the plan of planting peas and beans between better.

I will leave the matter of tying the buds and packing till another time.

Those who take up asparagus culture on the coast have a great advantage if seaweed can easily be procured, as it is one of the finest manures for asparagus, whether ploughed in or used as a mulch on the surface. Along the south and west coasts of England it is used extensively. A disadvantage is that it is heavy to cart. However, if the land be some little distance from the coast, the seaweed can be collected and stacked in heaps, and a lot of the water will drain out and the heaps slowly decompose, when it can be more easily carted.

To the uninitiated the methods I have described for preparing the land for asparagus may appear long and unnecessary, but I strongly believe in "If a thing is worth doing it is worth doing well." *Ex nihilo nihil fit.* Therefore I say do the work well and you will not regret it, because asparagus is one of those crops which pays to do well, and if you cannot do it well, better to leave it alone.

I advise using ½-in. bones, basic slag, and horse-hoof parings because these manures furnish a grand basis for the plants to feed on; they are very slow acting, rendering food for the roots for a number of years; they are insoluble in water, therefore food is not washed beneath the reach of the roots. Tanyard refuse, shoddy and leather dust are also such-like manures. Leather dust is the clippings and odds and ends of kid gloves, obtained from glove factories, and very useful in a sandy soil. I know asparagus beds in England forty years old, and good buds are being cut off them. Out here there is no reason why plants should not last twenty years, so furnishing the reason why it is necessary to prepare the land thoroughly and use manures that will last.

FLAX-GROWING.

We have repeatedly drawn the attention of Queensland farmers to the value of flax as a farm crop, both for the production of fibre and linseed, instancing the success which has attended the enterprise of flax-growers in Victoria. As far back as 1895 samples of flax grown on the Darling Downs were exhibited at the summer show of the Queensland National Agricultural and Industrial Association. These samples were from Pittsworth, and were sent for valuation to a prominent mercantile firm at Dundee, Scotland. The report was that it gave the very high yield of 88·79 lb. of fibre per cwt. of straw. This was very satisfactory so far; but, owing to the seed having been allowed to mature on the plants before they were pulled, and also to probable injury during the steeping process, the fibre was too brittle, and consequently was unsuitable for sail-cloth yarns or for any ordinary purpose in the linen trade, but still it was adapted for roping purposes. The samples were valued at from £18 to £22 per ton. This was, we believe, the earliest attempt made by the Queensland Department of Agriculture to encourage the flax industry, and the conclusion arrived at was that flax could not be grown successfully in this State. Now, the same conclusion was actually arrived at by the ever-present pessimist that neither sugar, cotton, or coffee would ever be successes here. How much truth there was in this has been amply refuted by one-time heavy exports of cotton from Southern Queensland, by the later successful cultivation of coffee both in Southern, Central, and Northern Queensland, and by the permanent establishment of a highly productive sugar industry from one end of the State to the other. If the first flax-growers had followed

the example of the cotton and sugar growers, the former industry would long since have been firmly established, at least in the high cool districts of the tableland. Still, there were some progressive farmers on the Downs, who brought more practical experience to bear on the subject of flax-growing, especially on the production of flax straw, and the reports on these samples submitted to experts were eminently satisfactory. Everything—colour, length and strength of fibre, and freedom from brittleness, went to show conclusively that flax grown on the Darling Downs was quite equal to any grown under climatic conditions in Europe, especially in Italy, similar to those of the Darling Downs.

The methods of cultivation, harvesting, dew-retting, and seed-production have been described in this journal on several occasions, the latest having been published in the issue of December, 1907.

FORMALIN FOR SEED WHEAT.

The action of formalin has been found to interfere seriously with germination, but this effect is also noticeable when the seed is treated with bluestone or any other solution used to kill the spores of smut in wheat. But this only occurs when the wheat meets with a spell of dry weather, but where germination takes place quickly the formalin-treated wheat does not suffer appreciable injury. Germination depends on the quantity of formalin used. With a solution of 1 lb. in 40 gallons of water the germination is exactly the same as with untreated wheat, but a reduction of germination becomes very marked where 2½ lb. to 3 lb. formalin have been used. The right proportion, therefore, is 1 lb. to 40 gallons. By using this, from 820 to 969 grains per 1,000 will germinate, and freedom from smut is assured.

Only prepare the quantity required for immediate use. Spread the seed on a wooden floor, sprinkle the solution over it, turning the grain over and over so that all grains are properly wetted. Then spread the seed out to dry, and it will be ready for sowing next day. Formalin, unlike bluestone, is volatile, and can only be used once.

When buying formalin, get Schering's formalin, which, in Adelaide, costs 2s. 10d. per lb., in 1-lb. bottles. Always keep the bottle well corked, and as it is a colourless poison, it should be kept where children and ignorant persons cannot get at it.

HANDLING WHEAT.

We have already written fully on the subject of Grain Elevators (*see* Vol. VII., pp. 102, 111, 235, and particularly Vol. XI., which contains a voluminous paper on the subject by Dr. N. A. Cobb).

On this matter the "Review of the River Plate" says:—A most successful public trial was made in Argentina recently of a portable grain elevator, which has been designed and patented by Mr. William Goodwin, for quick and economical loading of grain, whether in bags or in bulk, and whether loaded direct into railway wagons or deposited in piles in warehouse or in station grounds. With the assistance of a portable elevator, grain can be weighed and loaded into railway wagons in about one-third to half the time that is occupied by labourers doing all the work by manual labour, the cost of handling being correspondingly reduced since fewer men are wanted. The machinery, of simple description, is driven by a petrol motor. It is

erected on a light cane framework on which it can be taken to any desired part of a station, or when dismantled, can be quickly sent to another station, the complete weight being under 1½ ton. When loading in bulk the bagged grain as it arrives from the farms is deposited upon ordinary platform scales, and when weighed the contents of the bags are raised by the elevator leg to sufficient height for distribution by means of a blower fan with bifurcated spouts to any part of the wagon or pile. There is no hand labour after the bags have been placed on the scales. Speed of loading bulk grain will depend on the speed of cutting open the bags, because the machinery can be made of any desired power, but under ordinary conditions of station traffic a maximum speed of 60 tons, with working speed of 40 tons, will probably be found sufficient and will allow for delays in moving carts or wagons. When loading bags, they are placed upon an inclined stand resting upon a platform scale and are afterwards slid on to the inclined conveyor, which delivers them at convenient height to be taken by men in the wagon and very quickly stowed in position. The speed of work with bags is about the same as with bulk, and wagons in either case are moved into line by means of a hauling drum attached to the motor. This is the first practical step towards the introduction of the U.S.A. system of storage and transportation in grain and bulk, that should not only benefit railway companies by increasing the output of their rolling stock, and growers by reducing the cost of handling, but should also give to the latter the very great advantages they would obtain from a proper mixing of grain into uniform qualities, in the same way that exporters mix all their purchases in the hold of a steamer. If wheat is sampled in a pile, or in a wagon, not only will the cost of the operation be less than when samples are taken in the present most unsatisfactory method of spearing each bag, but many difficult questions will be avoided, and the seller will know exactly the quality of his produce. The railway companies have for some years past been provided with a large number of wagons suitable for carriage in grain and bulk; there are grain elevators at the ports, but up to the present time there have been absolutely no appliances for loading wagons with bulk with sufficient speed and economy, nor indeed have any mechanical appliances been used for reducing the cost and increasing the speed of handling bagged grain at stations. Wheat-growing moves from station to station in an uncertain manner, and there has been little inducement for anyone to erect station elevators of permanent and therefore somewhat costly construction, because to do any good they must be of sufficient size to deal with a reasonable proportion of the heavy tonnage that may have to be handled in a few months, whereas open-air storage is not only cheap but satisfactory, because the piles of either bags or bulk can be perfectly protected from weather damage by temporary roofing or simply when covered with sheeting.

EXPORTS AND IMPORTS OF FRUIT.

A return prepared by the Agricultural Department of fruit exported from Brisbane during May gives a total of 25,404 packages, made up of 11,832 cases of pineapples, 10,509 cases of oranges, 2,588 packages of bananas, 95 cases of papaws, 207 cases of tomatoes, and 173 bags of sweet potatoes. Sydney took 7,385 cases of pines, 2,207 cases of bananas; Melbourne received 9,582 cases of oranges and 4,351 cases of pines. Small quantities were sent to Adelaide, Perth, Albany, Hobart, and New Zealand. The quantity of fruit imported totalled 38,277 cases; and 738 crates of bananas and 1,344 cases of fruit came from the North.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF MAY, 1910.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Average Test Per cent.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Lubra ...	Grade Jersey .	17 Mar., 1910	689	4·6	35·65	
Lady Sue ...	,, Holstein ...	4 Apr. ,,	750	3·6	30·00	First calf
Linda ...	Ayrshire	10 Apr., 1909	477	4·2	27·43	
Orange ...	Guernsey-Shorth'n	13 Dec. ,,	499	4·7	26·40	
Carrie ...	Jersey	26 Feb., 1910	471	4·6	24·36	
Cocoa ...	,, ...	12 Sept., 1909	468	4·6	24·21	
Nita ...	Grade Guernsey ...	24 Jan., 1910	553	3·8	23·40	
Gem ...	Shorthorn ...	22 Jan. ,,	496	4·1	22·74	
Royal Lass ..	Ayrshire	22 Apr. ,,	492	4·0	21·98	First calf
Lerida ..	,, ...	26 Jan. ,,	516	3·8	21·84	
Bluebell ...	Jersey	29 Jan. ,,	457	4·0	20·42	First calf
No. 112 ..	Grade Jersey .	25 Dec., 1909	445	4·1	20·40	
Bliss ...	Jersey	5 Oct. ,,	390	4·5	19·72	
Daisy ..	Holstein	1 Nov. ,,	491	3·6	19·63	
Rosalie ..	Ayrshire	3 Jan., 1910	415	4·0	18·99	
No. 6 ..	Shorthorn ..	19 Nov., 1909	413	4·0	18·45	
Dot ..	,, ...	1 Nov. ,,	404	3·9	17·58	
Laura ..	Ayrshire	16 Oct. ,,	386	4·0	17·24	
Conceit ..	,, .. .	22 Nov. ,,	394	3·9	17·13	
Madge ..	Grade Holstein .	24 Jan., 1910	415	3·7	17·08	
Lass ...	Ayrshire	15 June, 1909	361	4·2	16·97	
Comet	Grade Holstein .	14 Nov. ,,	410	3·6	16·40	
Whitefoot ..	Holstein-Devon ...	2 Oct. ,,	386	3·8	16·33	
Red Rose ...	Shorthorn ..	21 Sept. ,,	356	4·1	16·32	First calf
Bangle	,, ...	26 Dec. ,,	364	4·0	16·26	
Bee ...	Jersey	23 Dec. ,,	312	4·5	15·77	
Dora .	Shorthorn ...	29 Nov. ,,	372	3·8	15·74	
Ethel .	Holstein-Shorth'n	9 Oct. ,,	388	3·6	15·52	
Dewdrop ...	Holstein	1 Nov. ,,	410	3·4	15·42	

Grazed on natural pasture, and fed with ensilage 30 lb. per day.

SOILING CATTLE.

The methods adopted for feeding stock on a farm are pasturing and growing crops of maize, lucerne, oats, barley, rye, and sorghum, which are mown before they come to maturity, or cowpeas, vetches, and such like plants, which are cut green and are daily given to the cattle in the cowyard or the milking-shed. The term "soiling" has been given to the latter practice of keeping cattle confined and feeding them on this green-cut food. The two systems here mentioned have been the subject of endless discussion in European countries; and, even to the present day, it has been undecided as to which is the most remunerative plan. Now, in Queensland we have a very different climate to, say, that of Denmark; and dairy cattle, with certain precautions, such as rugging and provision against cold winds in the way of shelters, may safely be allowed to run in the open all the year round. Experiments have been made to find out how much nutriment can be got out of a field of lucerne, clover, or grass by the method of pasturing, and how much by soiling. But

it has always been difficult to arrive at any certain conclusion, because, when cattle are turned into a field to graze, they waste a great deal of fodder by trampling it into the ground, and often they discover some particularly sweet patch on which they will linger until they have eaten it quite bare, also, much grass or lucerne is destroyed by the animals' droppings. What has been proved, however, is that, where a field could be mown only three times a year, it would be better to soil the cattle on the produce than to allow them to eat it down; whereas, if only two cuttings could be made, pasturing would be the better plan. This is all very well for the old country, but in the case of our lucerne fields, which can be mown six or eight times a year, it would obviously be a mistake to turn cattle in to eat it down (not to speak of the danger of hoven); far better to mow it and feed it green or turn it into hay or ensilage. Then, if the cattle are properly housed or yarded, and the manure regularly collected, an immense amount of farmyard manure—the very best of fertilisers—would be the result; and the farmer would have the further advantage of being able to distribute the manure as he pleased, and to distribute it evenly. Pasturing in the open field always results in unequal manuring of the land, because some parts, especially those where the cattle camp at night, are much over-manured, and other parts get no manure at all. The argument in favour of soiling is, that a much larger number of animals can be kept on the same piece of land by pasturing them. Taking, however, all things into consideration, the reasons which obtain in cold countries for soiling in preference to pasturing do not hold good in our warm climate.

The Orchard.

METHOD OF CAUSING EARLY FRUITING IN MANGOES.

The accompanying illustration of a young mango-tree fruiting at twenty months old is taken from the "Agricultural News," Barbadoes. In a previous article on the subject of causing early fruiting (Vol. VIII., p. 228) reference was made to a way in which mango plants may be caused to bear much earlier than is the case normally, in order that the quality of the fruit that they will yield may be determined. It is stated there that Mr. Joseph Jones, the Curator of the Botanic Station, Dominica, had called attention to the fact that the shock caused to the plants by grafting and heading back would in some cases induce the stock to bear fruit when only twenty months old. Others have found that, similarly, twisting the top of the stems of mango seedlings, slightly damaging them, or binding them, will cause early fruiting, and give an opportunity for determining the value of their produce.

The illustration on this page has been reproduced from a photograph of a grafted mango plant, sent by Mr. Jones. It shows a mango stock, that has been used for grafting purposes, bearing a well-developed fruit, although its age was only about twenty months.

Plate 1.

20 Month-old Mango Tree Fruiting.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

BY F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order LEGUMINOSÆ.

TRIBE HEDYSAREÆ.

SMITHIA, Ait.

S, sensitiva. *Ait.* Leaves sensitive. An annual plant from 6 in. to 3 ft. high. Stems very slender, much branched. Leaves pinnate, without stipella. Stipules membranous, rhachis bristly, 1 in. or more long; leaflets from five to twenty, ¼ to ½ in. long, with subparallel edges, bristly on the midrib on the underside. Flowers 1 to 6 in close, short-pedunculate racemes, in the axils of the uppermost leaves. Pedicels short, ascending. Calyx ¼ to ⅓ in. long, lips acute, entire, with a few short deciduous scattered bristles. Corolla yellow. Articles of pods 4 to 6, densely papillose on the faces.

Hab.: Glasshouse Mountains, *F.M.B.*, and Proserpine, *D. Finch.* This species besides Australia is met with in India, Madagascar, Abyssinia, Java, and China. The other species met with in Queensland is *S. geminiflora*, Roth., *var. conferta*, J. G. Baker, in Hook. Fl. of Brit. Ind., given in Fl. Austr. ii., 228, and Ql. Flora, page 408. *S. conferta*, Sm.

Order MYRTACEÆ.

EUCALYPTUS, Lhèr.

E. trachyphloia *F. v. M.*, forma *fruticosa.* For many years may have been observed on the Glasshouse Mountains—a dwarf form of our "White Bloodwood." It flowers and fruits when only about 5 ft. high, and is certainly a worthy plant for garden culture, and if thus brought into use would require some name whereby it might be distinguished from the common form of the species, hence I have attached to it the above name, fruticosa. We, however, so far, have no proof of seedling plants retaining the dwarf habit, yet there is no reason to suppose otherwise, for this may be looked upon as a sport like many other variations in the genus. Baron von Mueller notices in his Eucalyptographia Decade 5 this mountain form, but does not mention any particular locality; it may, however, have been in this same place, for I believe that he and Walter Hill together did some collecting in that locality in the early days of Queensland.

XANTHOSTEMON, F. v. M.

X. oppositifolius, *Bail.* Luya's Hardwood or Penda. Flowers in hoary umbels or cymes, bearing 2 to 5 flowers in the axils of both the terminal leaves. Peduncles rather slender, ½ to 1½ in. long. Bracts lanceolate, fugacious. Pedicels slender, 3 to 6 lines long. Calyx about 3 lines long, the tube and lobes of equal length, hoary and prominently dotted. Petals softly pubescent, longer than the calyx—lobes, rotundate, creamy white black dotted. Stamens about 30, at first curved, then spreading in a single row, filaments flattened towards the base about 5 lines long; anther versatile, lunate, ovary hoary-white, free except the base, style glabrous, long as the stamens. Add to description in Queensland Flora, page 642, the flowers not available before.

Hab.: Kin Kin, *W. D. Francis.* Flowering specimens.

Order APOCYNACEÆ.

ALYXIA, R. Br.

A. magnifolia, *Bail sp. nov.* This plant principally differs from *A. ruscifolia,* R. Br., in foliage, and might have been given as a variety of it, but then *A. ilicifolia* would also have to be included in the same species.

The leaves of this new species are ternate or opposite, 3¼ in. long, 2¼ in. broad, form as in the normal form of ruscifolia. The fruit is also similar to that species.

Hab.: Near Lake Cootharaba, *Jas. Keys.*

Order CAPRIFOLIACEÆ.

LONICERA, Linn.

Calyx-tube ovoid, limb short, 5-toothed, deciduous or persistent. Corolla tubular, funnel-shaped, or campanulate; tube short or long, gibbous or equal at the base; limb subequally 5-lobed or 2-lipped; lobes short or long. Stamens 5, inserted on the corolla-tube. Ovary 2 to 3-celled; style slender, stigma capitate; ovules several in each cell in double rows on axile-placent. Berry 2 or 3-celled or sub-1-celled. Seed few in each cell, ovoid or oblong, albumen fleshy; embryo terete. Shrubs erect or scandent; buds scaly, leaves opposite, petiolate, sessile or connate, entire or sinuately lobed. Flowers often in pedunculate pairs, often connate by their ovaries, bracteate and usually 2-bracteolate; peduncles axillary, solitary, or in subterminal panicles, heads or clusters subtended by floral leaves. Species about 80 in temperate and subalpine regions of the Northern Hemisphere. C. B. Clarke in Fl. Brit. Ind. iii. 9.

L. confusa, *DC.* Prod. iv., 333. The Gold and Silver Flower. Branches twining, pubescent; leaves ovate, more or less acute, rounded at the base, downy on both surfaces as well as on the petioles. Peduncles axillary, longer than the petioles, 2-flowered, opposite, disposed in something like a thyrse at the tops of the branches. Calycine segments ovate, and as also the corollas pubescent. Fruit a small black berry. A native of China and Japan, commonly met with in our gardens, but now, I am told by Mr. Jas. Keys, become a roadside weed on the Blackall Ranges.

Order SOLANACEÆ.

CYPHOMANDRA, Sendtn.

Calyx 5-fid or 5-parted, corolla campanulate, tube short, limb 5-parted, estivation valvate. Stamens 5, adnate to the throat of the corolla, erect or ascending; filaments short, cohering in a ring at the base; anthers erect, elongate, 2-locular, dehiscing in apical pores, connective dorsal. Ovary 2-locular. Style simple. Stigma bicallose. Berry oval, juicy, large. Seeds numerous in the pulp, compressed. Shrubs with entire 3-lobed or pinnatifid leaves. Flowers in racemes or cymes with sometimes scorpioid branches. Species about 24, natives of South America.

C. betacea, *Sendtn.* in Mart. Fl. Bras. x. 119. Tree Tomato. A tall shrub, bark pale, wood soft, branches stout. Leaves 4 to 8 in. or more long, ovate-cordate, acuminate, softly puberulous, lurid green above, paler beneath, with 5 to 9 pairs of spreading nerves; the leaf-stalks 4 or more inches long, stout, tirete, pubescent. Cyme 2 to 5 in. broad, subcorymbiform, 2-3-chotomously divided; peduncle shorter than the leaf-stalk, pedicels 1 in. long, flexuous, thickened upwards on the fruit. Flowers 1 in. diam. Calyx cupular, obtusely 5-lobed. Corolla campanulate-rotate, segments recurved, white or tinged with pink. Filaments shorter than the

oblong anthers, which are about half as long as the corolla. Style short, columnar, stigma small. Berry 2 or 3 in. long, ovoid, fleshy, orange-yellow, often suffused with red, 2-celled, many-seeded. Seeds orbicular, compressed, narrowly winged all round. Hook. Bot. Mag. 7682.

Hab.: Mexico. Naturalised in the dense scrubs of the Blackall Ranges, *Jas. Keys*, May, 1910.

Order PROTEACEÆ.

TRIBE GREVILLEEÆ.

MACADAMIA, F. v. M.

M. minor. *Bail sp. nov.* Small Fruited Queensland Nut. A small tree or large shrub sending up many stems from the base. Branchlets slender, tuberculose. Leaves ternate, sometimes opposite, often crowded at the upper portion of the branchlets, lanceolate ½ to 2 in. long, 3 to 9 lines broad, with sharply-pungent, distant teeth on the margin, point also pungent, lateral nerves rather distant, the raised reticulation prominent on both faces. Petioles slender, about 2 lines long. Peduncles ½ in. long, bearing 1 or 2 lineal bracts about 1½ line long; raceme about 3½ in. long; rhachis stained with red, and more or less covered with white short hairs; pedicles 1½ lines long, hairy in pairs or almost verticillate. Perianth segments pubescent, outside 2 or 3 lines long, but much twisted. Hypogynous glands united in a ring. Ovary villous, style slightly hairy, twisted in the early stage but soon becoming straight, stigma clavate. Fruit ovate, about 1 in. long, 7 lines broad in centre, exocarpe velvety outside, grey, bursting down one side and exposing the endocarp or nut. Nut about 8 lines long and 6 lines broad, tapering to a point at the top in some specimens, when the nut becomes top-shaped.

Hab.: Eumundi, *Mr. Ball.*

The fruit, or rather the nuts, have been known to me for many years, but until now no other parts have I seen. The first shown to me were by the late Mr. A. J. Hockings about 36 years ago, and he tried at the time to obtain botanical specimens of the plant, but failed. His nuts were from the Pine River.

Order ORCHIDEÆ.

SUBTRIBE DIURIDEÆ.

PTEROSTYLIS, R. Br.

P. Whitei, *Bail. sp nov.* Radical leaves about 4 lines long, ovate-rotundate, slightly pointed, 3 or 4 forming a rosette, a little raised above the ground on the stem; below this are 3 loose sheathing scarious, truncate scales. Some little distance from the above arises the flowering scape, which is very slender, and attains the height of 5½ in. at the immediate base; it is somewhat bulbosely enlarged. The leaves or bracts 3 or 4 near the middle, narrow-lanceolate, spreading, 4 to 5 lines long. Flowers 3, distant from the leaves and each other. Bracts loose lanceolate, membranous, brownish, about 6 lines long, enclosing the pedicel and part of the flower, pedicel very slender, segments of flower all narrow, and tapering into longish filiform points, prominently striped with red, lateral sepals rather shorter than the other segments; labellum brown and rather short.

Hab.: Glasshouse Mountains, *C. T. White.*

Order JUNCACEÆ.

XEROTES, Banks.

X. confertifolia, *Bail. sp nov.* Stems numerous, arising from an elongated rhizome, the first 1 or 2 in. emitting wiry roots, then more slender, ¼ in. thick for about 6 in. or more, from thence branched and rebranched,

the branches becoming still more slender; all from base of stem clothed with thin narrow flexuose leaves split or forked at the apex, 5 to 8 in. long, ½ to 1 line broad, the scarious stem-clasping base very open, about 1 in. long. Inflorescence 3½ in. long, spikelike, the peduncle flat, ½ line broad, rhachis rather thicker and not quite so broad. Male flowers in distant clusters 5 to 10 along the rhachis; the clusters bearing fine pungent bracts, bracteoles scarious with short pungent points, about one-third of the length of the perianth; perianth-segments of a thicker texture than the bracts, about 1 line long, the outer ones somewhat longer and of a dark-purple with narrow white streaks. Stamens about half as long as the perianth. Female flowers and seed not obtained.

Hab.: Glasshouse **Mountains,** *Bail.;* Mount Cooroy, *Bail.* and *Simmonds;* Mount Perry, *Jas. Keys.*

Order GRAMINEÆ.

SPOROBOLUS, R. Br.

S. pilifera, var. major (Kunth.), Hook. Fl. Brit. Ind. vii. 252. Stems erect or suberect, compressed; leaves, glabrous; sheaths striate, glabrous or nearly so, more or less ciliate, gaping and bearded in the upper part, ligula very short, ciliate; leaf-blade somewhat rigid, suberect, subconvolute, sublinear, striate, especially the lower part sparingly ciliate, somewhat scarious above, smooth on the under surface. Panicle erect, contracted, the lower part subinterrupted. Peduncles smooth, rhachis angular, branches short, subverticillate or almost solitary, of irregular length; spikelets erect, subsolitary, when closed linear, lanceolate, acute, glabrous, glumes, the outer subulate, lanceolate, acute, nerveless, second and third lanceolate, 1-nerved, valves of equal length, or the upper one smaller, the lower one lanceolate, subulate, 1-nerved, upper one narrow-oblong, 2-nerved. The flowering glumes 2-toothed.

Hab.: Railway line, Glasshouse Mountains, *C. T. White.* May have been introduced and become naturalised. A native of Brazil.

A NEW RAILWAY TIME-TABLE.

Railway time-tables, as a rule, become yearly more bulky and complicated as railway extension proceeds, and the Queensland tables have been no exception to the rule; indeed, so rapidly are new lines being built that in a very short time the tables threatened to be as troublesome as the British Bradshaw. But there has just been issued by the Railway Department a most handy and simple Annotated Time-table, which completely does away with all complications as to times of arrival and departure of trains, as well as giving the distances between Brisbane and country stations and the altitude in feet of such stations above sea-level. Furthermore, information is given concerning coaches which meet trains at various points. The Table is divided into three sections, the first dealing with the Southern mail train from Brisbane to Wallangarra, the second to the Western line between Toowoomba and Cunnamulla, and the third with reference to the North Coast Line from Brisbane to Rockhampton. Besides this, general information concerning each mail train, such as regulations as to sleeping berths and refreshment stations, is given. Then short descriptive and historical notes, with statistics, are appended to the name of each station. Maps of the S. and W., W., and Northern Lines accompany each section. Such a time-table is quite new to Australia, and travellers will now have no trouble whatever in gaining valuable information without having to overhaul page after page of confusing time-tables. The book has been excellently got up, and in handy form, by the Government Printer.

Horticulture

HINTS ON THE CULTIVATION OF CARNATIONS.

Carnation-growing of late has made rapid improvements.

The old varieties are very rare in an up-to-date growers' garden.

The perpetual varieties are most popular for their continual blooming.

Spring varieties produce beautiful flowers for the spring shows, but after that season very small results are obtained, thus making the perpetual varieties sought for.

Carnations may be grown successfully in almost any soil, providing it is prepared with a knowledge of their requirements.

Carnations require to be grown from the shade of trees and high fences to keep them healthy and free from disease.

A convenient size bed for the carnations to grow in is about 4 ft. wide, and as long as the garden will allow.

This enables the grower to get about the plants to tie them up or do anything in connection with their requirements.

The best soil for the carnation to grow in is a stiff loam with enough grit in it to make it friable.

When digging up the bed avoid bringing up subsoils, and raise the bed a few inches above the path to avoid an excess of moisture. Although carnations love water, they cannot thrive with swamping.

Should the soil be light, add anything in the way of decayed cow manure or garden refuse well decomposed, heavy loam, or clay.

If on the contrary the soil is stiff, give a good coat of lime, wood ashes, or sand, and dig well in. Make a rule to have the beds made a week or two before planting.

MANURE.

The most practical way to use manure is to judge yourself the condition of the soil, and work into the bed bone dust or bone manure not too fine ground up to ½ lb. per square yard.

Avoid at all times strong chemical manures, unless you plant the carnations as annuals.

Best liquid manure is made from cow manure.

The steady growing of the carnation is most preferable. When the plants show a blue-green sheen on the foliage, they are doing well.

PESTS.

Although the carnation is a hardy growing plant, it is not without its pests.

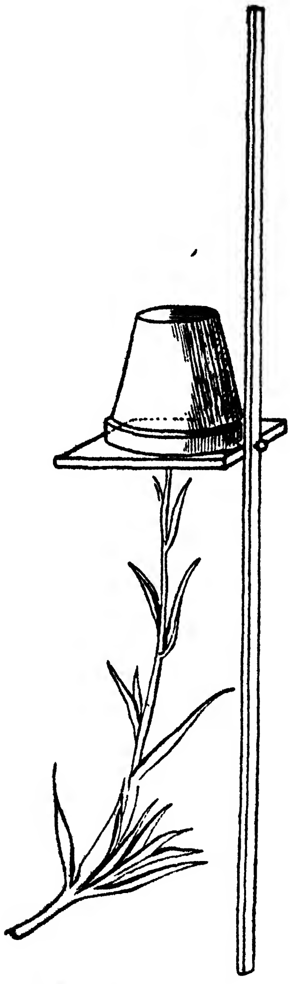
Thrip in the spring time is most troublesome. It will spoil the best of flowers if steps are not taken in time to check them.

Gishurst compound, used as per directions on the box once or twice a week, is one of the best remedies. The best time to use this preparation is in the evening, and when the plants are showing the buds. This remedy is also a great check on the small black ant.

PREPARING FOR EXHIBITION.

In preparing the buds for exhibition it is well to thin them out, leaving from four to ten buds, according to the strength of the plants, leaving crown

buds to flower. These should be set up into brackets (as illustrated) before the buds commence to open, using airtight flower pots to cover them. This mode of covering protects the flower from the weather and pests, and allows the flower to develop to its full size. It is most interesting to look at the flowers in their different stages.



Carnation Bracket in Position.

Should the black ants find their way into the brackets after the flower, tease out a small piece of cotton wool and cover the flower up. This prevents the ants from getting into the flower to carry on its destruction.

The carnation bracket is my own manufacture.

RUST.

This is a round swelling of the leaves, which afterwards bursts and sets free more spores of the fungus. The most effective way to deal with it is to cut the affected leaves off and burn them. Give frequent dustings of fresh lime. The same applies to spot, which is noticed as purple spots, chiefly caused through dampness in the cold wet months.

DRESSING BLOOMS.

I strongly object to this practice. It is not sportsman-like to do so. Exhibit the flowers as you have grown them; it is more satisfactory to your neighbour, and to your credit and honour.

Carnation-growing should not be brought down to making the flowers. Keep the cultivation of the carnation as a hobby; the game will last much longer, and the competitions will be most keen and sought after.

PRUNING.

This is a very important item. Take away all dried shoots and flowers, keep young wood going, and your plants will be very little trouble. After spring flowering season, most work will be found.

PROPAGATING.

The Perpetual varieties will strike root readily from cuttings taken from the flower spike. Pull the cuttings off and take away the lower leaves, place in a box about seven inches deep containing sharp sand half its depth, cover the box with glass, and keep in a shady place, keeping the sand moist. Dry the glass daily, and remove the same when the cuttings begin to grow.

Spring flowering varieties will give the best results from layers. Choose healthy young wood for the purpose. Choose healthy young wood for the purpose, clean away all dry leaves, &c., make a slit underneath about one inch long, and pin the same down, covering the layer with sand or light soil.—"Australian Gardener."

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1909.								1910.				
	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.
North.													
Bowen	2·32	1·98	1·23	0·13	0·21	0·36	3 15	19·98	15·45	7·10	21·45	5·26	0·18
Cairns	1·06	2·48	0 65	2·48	0·7	3·19	7·31	15·24	21·80	17·12	24·16	16·13	3 51
Geraldton	5·98	9·13	6·53	5·32	0·36	6 71	14·57	19·98	20 35	34·57	33 74	24 57	11·90
Gindie State Farm ...	...	..	.	..				...	.	. .			
Herberton . ..	0·81	1·22	0·20	0·75	0·50	2 30	4·50	5·11	16·64	12·21	12 40	3·50	1 85
Hughenden .	Nil	1 71	1·37	0·33	0·8	1 95	0 54	8·01	4·52	3·59	2·95	0·30	0·41
Kamerunga State Nurs.	0·97	..	...	..				.	...			...	.
Mackay	2·33	2·05	4·00	0·75	0·73	2·88	3·18	25·56	35·28	9 73	24 31	6·18	3·73
Rockhampton	0 03	1·33	2·99	1·37	1·20	2·16	4·55	2·74	11·93	1·28	19·84	0·61	0 59
Townsville	1·07	1·51	0·83	0·57	0·12	2·07	1·31	11·51	23 07	10 85	17 21	2·29	0·26
South.													
Biggenden State Farm	0·72	2·60	4·01	1·78	0·29	.	2·83	6·96	7·22	3·99	3·82	0·73	1·06
Brisbane	0·82	1·75	2·10	2·44	2·74	1·56	4·14	6·45	7·24	4·19	6 42	1·22	0·43
Bundaberg	0·67	1·51	5·65	1·66	0·98	0 42	3·55	2·99	11·81	2·43	8·92	0·31	0·19
Dalby	Nil	1·87	1·19	3·13	0·47	1·92	2·13	2·45	10·88	1·33	3·87	Nil	Nil
Esk	0·36	2·43	2·74	3·31	2·60	2·61	2·69	9·20	8·60	1·94	6·09	1·19	0·27
Gatton Agric. College	0·32	1·22	2·02	2·09	2·29	1·87	.	3·92	11 79	..	8·66	0·89	0·61
Gympie	1·15	2·96	4·70	2·80	1·70	2 30	3·82	16·54	5·92	3·48	7·74	1·13	0 22
Ipswich	0·05	1·31	1·67	1·34	3·55	1·93	1·56	4·72	6·91	2·78	8·56	1·65	0·20
Maryborough	0·91	2·57	5·02	2·53	1·56	0·51	3.94	6·83	5·65	2·99	3·92	1·72	0·64
Roma	0·44	2·73	1·54	4·83	0·12	0·90	2·12	1·05	4·74	1·47	8·36	0·15	0·4
Roma State Farm ...	...	...	...	..	...		.	...	..	...	...	...	.
Tewantin	1·00	3·24	4·08	4·34	1·38	3·82	1·90	8·85	5·96	3·42	15·18	6·30	1·31
Warwick	0·70	1·23	2·04	2·28	1·77	2·85	2·77	4·25	3·93	3·14	2·57	0·68	0·55
Wellington Point ...	...	...	...	...	...	...	...	9·00	...	...	...	...	
Westbrook State Farm	...	...	...	...	...	.	. .	...	...	...		..	
Yandina	1·10	2·70	3·70	5·81	3·84	2·30	0·76	20·18	6·71	2·07	11·81	3·26	0.40

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND, Divisional Officer.

Tropical Industries.

SYNTHETIC RUBBER.

That some day in the distant future chemical science will discover a method of producing synthetic rubber is quite within the bounds of probability, but up to the present no chemist has yet succeeded in doing so. At the International Rubber Conference held in September, 1908, in connection with the International Rubber and Allied Trades' Exhibition at Olympia, London, delegates were present from all the rubber-growing countries of the world, and there was also an influential representation of scientists, planters, manufacturers, traders, and others interested in the rubber industry. Amongst the large number of papers on every phase of the rubber industry read by and discussed by the highest authorities on the subject was one by Mr. H. C. Pearson, on Synthetic Rubber, which is well worth perusal. The following extracts from the lecture will go far to allay any fears in the minds of rubber planters as to the imminence of a discovery which would probably have a very undesirable effect upon the production of plantation rubber. Mr. Pearson, who was received with applause, said:—

A great many years ago the whole scientific world, which was neither very large nor very scientific, spent a whole lot of time searching for the philosopher's stone, which, if I remember rightly, if properly approached, would turn almost anything into gold. We laugh at such childish folly to-day, and spend our time hunting for a philosopher's stone which shall turn everything into rubber. The transmutation of colloids is the dream of the chemist as well as of the experimenter. The only trouble is they don't transmute.

If correctly quoted, Professor Wyndham Dunstan, in 1906, put on record before the British Association at York that the synthesis of rubber would be an accomplished fact before that Association met again at York. Exactly where it would break out he did not indicate, nor whether it would be be characterised by mild or virulent symptoms. I should like to say personally that my acquaintance with synthetic rubbers of certain sorts dates back to many years.

It was nearly twenty-five years ago that I was first brought into contact with a gentleman, who was apparently an honest, blunt, hard-working experimenter, who, in a private room, behind locked doors, showed me a small sample of what appeared to be dry fine Pará rubber. It gave out a faint odour of winter-green, which, he explained, was added to it to destroy an odour that might lead some imitator to a knowledge of ingredients used in its manufacture. He assured me earnestly, calling upon the Creator of real rubber to be his witness, that it was wholly an artificial product, and contained no atom of caoutchouc; further than that, in a burst of confidence, he agreed to let me see some of the materials from which the product was made. With some secrecy we crossed the city, let ourselves into the basement of his house, part of which was a workshop and laboratory, where I was shown a gum, which I partially identified as kauri, and a grease which looked like cocoa-butter. There was a faint smell of bisulphide of carbon in the air, and he acknowledged that he used this solvent at a certain stage of the process, and that upon heating, and with the addition of a secret material, rubber appeared floating upon the liquid.

While we were talking, an eminent and somewhat grasping capitalist appeared, claimed he was there by appointment, which I did not believe then, but do now, and at once went into executive session with the inventor, leaving me on the outside. It was a bitter blow to have millions torn so

rudely from my grasp, particularly as I had mentally already squandered several hundred thousand pounds. However, I was out, and had to make the best of it. As for the gentleman who was *in*, just to complete the story, it might be well to add that he erected a spacious factory in which were strange machinery, secret rooms, glass floors, and other unusual and expensive paraphernalia; and for a number of years paid, while the inventor toiled, until one day the building was closed, and has remained so up to the present time.

From that day to this neither the capitalist nor the inventor could be induced to say a word about their experiments or why they failed. I fancy the reason why the capitalist would not talk was because he lost a great deal of money through the venture; and the only reason why the inventor doesn't talk is because he is dead.

In the bottle marked A is a sample of this type of synthetic rubber. One of the Presidents of the United States had a relative who had a little money and was anxious to make more. He, therefore, entrusted some £8,000 of it into the hands of a cultured, gentlemanly, persuasive chemist, who had brought to him some 20 lb. of what appeared to be high-grade rubber, which the chemist, by the use of many technical terms wholly incomprehensible to the ordinary business man, assured him was an entirely synthetic production. The £8,000 went for the equipment of a little factory near New York City, for the erection of a secret room from which daylight was excluded, and which only a certain shade of red light light was allowed illumine, and incidentally for some very excellent champagne suppers at New York's most expensive hostelries. It was just when the initial investment was about exhausted that the matter was brought to my attention, and in this way.

With great secrecy a ten, twenty, or thirty million dollar company was projected, and all the machinery for selling much stock was secretly set in motion. One of the wealthy men approached, had a lawyer who knew something about rubber, and was very much of an investigator. He came to me first to size up the probabilities and to outline a method of investigation. The first move was to insist that the rubber be made in his presence. This was agreed to, but the inventor stipulated that no chemist be present. The lawyer was then given a list of ingredients which he was to purchase and carry to the factory. These amounted to about 20 lb. in weight. The inventor was to add 1 lb. of a secret material or composition necessary to complete the process and to protect the formula.

A day was then set apart for the test. When that day arrived the chemist was sick. Another day was set, the pound of material necessary for the experiment had gone astray. Another day, the chemist's grandmother had died and he had to attend the funeral. Finally the test was begun, the materials, consisting in part of cellulose, water, and caustic soda, were set boiling, and kept at it all day long; during this time the lawyer waited for the change in the cotton fibre to appear, when at a certain critical moment the composition must be added, or else no rubber would result.

About supper time the inventor stated that the material could not be ready till about 11 o'clock that night, and suggested that the lawyer go out and get something to eat. The lawyer, of course, refused, but finally went, and although he was gone only thirty-five minutes, the critical moment came during his absence and rubber appeared.

The lawyer was very wrathful on his return, investigated the dark room where the final change took place, discovered a hidden panel leading to another room, and enough evidence of fraud to lead him to advise his client against risking a dollar in the venture, and the business went no further.

In an English paper of 4th September I read that synthetic rubber is now being made at Burton-on-Trent, and is called Burton rubber. I have not seen it, nor do I know the chemist, who may be the most honest and capable

man on the face of the earth, *but* if he can make synthetic rubber commercially, why does he seek newspaper publicity instead of making and selling the product? If he found nuggets of gold in his backyard would he write to the "Times" pages of argument to prove they were really gold, or would he quickly dig them up and put them into circulation? Just what base he works from is difficult to tell, but from his published formula the compounds would seem to be equal parts of old Burton ale and offensive smell.

In the bottle marked B. is what was given me as a sample of partially synthetic rubber made along lines which appeared to be new. As you all know the latex of a young Castilloa tree contains a great deal more resin than the latex of an old tree, the gum in the young tree containing about 40 per cent., that in the mature trees about 7 per cent.

The theory of the producer of this semi-synthetic rubber was that the tree in maturing turned its own resins into rubber, and that by the proper treatment of this resinous latex, the inventor could do just what nature did. I could not see at the time that he did it, and certainly the sample on exhibition does not prove his claim. When I first put it in the bottle it was very resilient, but contained 40 per cent. of resin.

Of course, you are all aware of Professor Tilden's experiments in Birmingham, where he succeeded in producing minute particles of india rubber from terpenes. These results are of high scientific value, but it is a question if that knowledge will ever be of the slightest commercial value, because it is going to be easier and cheaper to produce rubber latex, bearing a large percentage of india rubber, than to produce vegetable oils containing very minute quantities of india rubber.

It is impossible to consider a subject like this without coming into touch with a great variety of substitutes for rubber that have been, and still are, in use to a certain degree in rubber manufacture. The rubber manufacturers know, of course, that none of these are in any way real substitutes for the crude gum. They can be used in connection with india rubber and ofttimes add certain qualities to the compound that are of value, but there are very few places where they can be used alone in place of rubber. The most widely known of these are the oil substitutes which are so common that they need no explanation as regards their manufacture or use. There are also certain of the natural hydrocarbons such as mineral rubber, which are of definite use in adding certain quantities to many lines of rubber compounding.*

There is just one word of caution that the honest producer of a rubber assistant should have, or else he will deceive himself, and for a time deceive others. Suppose he is able to produce a fairly tough substitute that mixes well with rubber and is in no way harmful; indeed, under test the vulcanised product containing his assistant is stronger than the same vulcanised product without it. He at once believes that he has a wonderful product, and perhaps he has, but he hasn't proved his case by such a test. In fairness to himself and the manufacturer, he should test, not against a compound of pure gum and sulphur, but against compounds that contain earthy matter or metallic oxides which we all know add toughness to rubber goods, and if his is better or cheaper it is of value, otherwise not.

Mr. Pearson brought with him a very large collection of so-called synthetic rubbers and of substitutes. These were all on view, and at the close of the lecture a very general discussion ensued in regard to the history, method of preparation, and properties of the various samples.

Before the meeting broke up the chairman (Colonel Bosworth) thanked the lecturer on behalf of those present for his address, pointing out at the same time that he felt sure, after what Mr. Pearson had said, that none of them had anything more to fear from synthetic rubber.

* See "Queensland Agricultural Journal," June, 1910, "Plinatus Rubber," p. 3, Q.A.J.

RATES OF GROWTH OF RUBBER TREES.

The rate at which the various varieties of rubber trees grow is always a subject of great interest and of much controversy amongst rubber planters, and particularly is it of interest to those who have the intention of growing rubber in North Queensland. On this subject "Tropical Life," London, makes the following extract from the "Annual Administration Report" (1908-9) of the Government Botanic Gardens and Parks, the Nilgiris (Government of Madras) of particulars of the rate of growth of various rubber plants:—In the report itself, particulars for six dates are presented, but only three of these have been taken—those for the beginning, the middle (approximately) and the end of the period of observation. In the following table, figures are given for the height (*a*), the girth at 1 ft. from the ground (*b*), and the girth at 4 ft. from the ground (*c*):—

Measurements.

Kind.		6 May, 1904		26 March, 1907.		4 May, 1909.	
		Ft	in.	Ft	in.	Ft.	in.
Average Ceara	*a*	21	10	32	0	38	11
	b	1	6	2	10½	3	9½
	c	1	3¾	2	6½	3	5
Para (from small seed) . ..	*a*	14	2	41	0	47	0
	b	0	5½	1	11	2	10
	c	0	3½	1	5½	2	3
Para (from large seed) ..	*a*	22	4	37	0	44	11
	b	0	7¼	1	8	2	6½
	c	0	5¼	1	4½	2	3
Para (typical)	*a*	16	6	35	0	40	4
	b	0	6¼	1	5	2	2½
	c	0	4¾	1	1	1	7
Para (good latex-yielding) ..	*a*	18	0	33	3	41	1
	b	0	6½	1	2½	1	11
	c	0	5	0	11½	1	6
Assam (Rambong) . ..	*a*	12	0	25	0	33	6
	b			1	10½	4	0
	c			2	3	2	10
West African .	*a*	13	6	*28	4	36	10
	b	1	2	1	5	2	1½
	c	0	5½	1	3¼	1	11

* Top injured.

YIELD OF LATEX FROM YOUNG CEARA RUBBER TREES.

Some investigations (says "Tropical Life,") that were made in connection with this subject are described in Bulletin 19 of the Hawaii Agricultural Experiment Station, entitled "Experiments in Tapping Ceara Rubber Trees." The first trial was made with eighty trees, which averaged 13¼ in. in circumference at 3 ft. from the ground, and were 23 ft. in height; the first branches were at 10 ft. from the ground. The trees were tapped by means of one vertical cut each day, and nearly thirty-seven hours of labour were required for tapping them, collecting the latex, and obtaining, by coagulation, 1½ lb. of dry rubber. It was found that four ordinary Japanese labourers, who had had no previous experience of the work, could tap eighty trees in a period which varied between seventeen and forty minutes.

In a second lot of trees, which numbered 160 in this case, two vertical cuts were made instead of one, and it only required forty hours of labour to tap the trees, collect the latex, and obtain 7½ lb. of rubber, of which 2½ lb. was scrap. The experiment showed that, with the prices which obtained for rubber at the end of 1909, when two vertical cuts were made daily, profitable returns were obtained from two-year-old trees. It has to be considered that the labour of tapping small trees is greater than that of dealing in the

same way with large ones, and that the yield of latex is much lower, so that, with the same amount of labour, more rubber would have been obtained from older trees.

It was found, during the experiments, that one labourer can tap about fifty trees in an hour, while the latex produced by the work of two such labourers can be collected by one. Subsequent experiments with mature Ceara rubber trees have shown that about ⅓-oz. of dry rubber may be obtained as a daily yield from each tree. This leads to the conclusion that three men should be able to obtain rubber from mature trees at the rate of about 1 lb. per hour.

In the matter of the relation between the size of the tree and the amount of tapping that can be effected, it was found that the area of bark on plants 4 in. in diameter will permit of tapping, with one vertical cut daily, for two successive weeks, or with two vertical cuts, every day, for one week. Larger trees would, of course, permit of the collection of latex for a much longer period.

THE RUBBER MARKET AND SUPPLIES.

THE STRONG FUTURE POSITION.

Latest mail advices from London show in a striking way the firm position of the rubber industry. Two years or more ago, when rubber prices were high, it was said that the Brazilian industry would be stimulated and that more expeditions would be fitted out, and that largely increased supplies would soon be the result. This, however, was by no means realised; for the production of wild Para was increased by only 570 tons in 1908 over 1907, and by only 830 tons in 1909 over the 1908 production.

The present position is remarkably firm, and points to higher prices yet during this year. The whole visible supply of Para rubber in the world on 1st April was 5,279 tons, against 6,038 tons at the same date a year ago, being a decrease of 759 tons. America had stocks in hand 740 tons less than in 1909; England had 289 tons less; and in Brazil, at the Para warehouses, the stocks were 390 tons less than in April, 1909.

The rubber received at Para during March, 1910, totalled 5,210 tons, the receipts during that month for the last four years being rather remarkable:

During March,	1910	5,210 tons
,,	1909	4,140 ,,
,,	1908	4,240 ,,
,,	1907	5,830 ,,

But during the period 30th June to 31st March, the Para receipts have been—

32,180 tons in	1909-10
30,420 ,,	1908-09
28,680 ,,	1907-08
29,390 ,,	1906-07

There is thus every indication that the present prices will continue and even advance; and it seems unlikely that the South American output will increase to any very appreciable extent for several years to come. It is, therefore, not to be wondered at that buyers are anxious about their supplies and are prepared to buy two years ahead to be sure of a certain quantity.—"Ceylon Tropical Agriculturist."

MAMARA COTTON.—A RIVAL OF CARAVONICA.

Messrs. Svensen and D'Oliveyra, well-known successful cotton planters in the Solomon Islands, after much experimenting with a view to producing a variety of cotton which should surpass the "wool" class of that variety, and a bush which should be more convenient than the tall-growing straggling

plant which produces the splendid and valuable "silk" Caravonica, appear to have met with signal success, as the following letter, addressed by them to the editor of London "Tropical Life," will show:—

We have much pleasure in sending you under separate cover a sample of Mamara cotton,* a perennial variety propagated and grown by us on our plantation in the British Solomon Islands.

Unfortunately, we have no quantity of this variety on hand at present to forward to London for sale. We shall, however, be pleased to forward some to you from our new crop, which comes on in two or three months' time.

We have, for several years, been growers of both the wool and silk varieties of Caravonica cottons. We found that the wool variety was unusable and unprofitable, whereas the silk Caravonica, though a heavy bearer, was a very awkward crop to handle. Although the trees were severely pruned down each year to try and decrease the height, they grew 12 to 15 ft., and cotton picking at that height became a heavy item; the price obtained was also not altogether satisfactory; consequently we had to look round for a cotton with good staple, a heavy bearer, and one that would not grow out of reach of the pickers. We started experimenting, and evolved our variety of Mamara cotton. This plant grows 5 to 6 ft. high, thus being well within the reach of pickers; it is planted 4 to 5 ft. apart and yields heavily. The staple is very fine, long, and silky, and has been very highly reported on from all sources. Last year we put our first shipment of this variety on the market and obtained 1s. per lb.

The variety, therefore, is a very handy and ready grower. We have been planting it as a catch-crop between coconuts, and, except a yearly pruning and keeping the trees clear of weeds, we have given it no cultivation. On account of the bushes growing low with a good spread, the weeding bill has been a very small item. The cotton gins very easily, gives a clean, flawless seed, and 33 per cent. lint, which is just about the same that we have obtained from our silk Caravonica. With our open planting as catch-crop between coconuts we get 800 lb. of seed cotton per acre.

A considerable amount of our seed from last year's crop has been sold, and we expect heavy booking for our July crop.

[Samples were given to Dr. Olsson-Seffer, who has laid down large areas under Caravonica in Mexico, and to a Uganda planter who is going out to Queensland to try both Caravonica and this Mamara cotton out there, since the quality, the yield, and the price seem so good. We do not altogether agree with our correspondent's view about Caravonica. Perhaps the circumstances under which they produced it caused the results to be less satisfactory. Elsewhere, except one case in East Africa, we have always heard good reports of Carvonica.—Ed. "*T.L.*"]

[The Uganda planter here mentioned is Mr. W. E. Collingridge, who arrived in Brisbane on 30th May last. He has proceeded North with the intention of combining sugar and cotton-growing under irrigation on the Burdekin Delta, where there are large areas under sugar and two fine sugar-mills, to which will shortly be added a third.—Ed. "*Q.A.J.*"]

COTTON-GROWING.

Notwithstanding the efforts made by the Department of Agriculture and Stock to revive the cotton-growing industry in Queensland, and despite the good profit realised by those farmers who took advantage of the facilities afforded by the Department in the way of importing and distributing the best varieties of seed, of making advances on the crops, and ginning and marketing the produce, very little interest was shown during the following season

* The sample of cotton referred to above came duly to hand, and was valued by the London cotton-buying experts at 15d. per lb.

even by those who had profited so well in the past. It will be interesting to show what the profits were which were realised by some amongst the 100 farmers in the Southern District who, in 1905, planted the seed imported by the Department.

No grower obtained less than £5 per acre, whilst some got over £15, and one planter of a small area realised £17 per acre.

Following are some figures furnished by growers in the Lockyer and Fassifern districts:—

No.	Acres.	Gross Return. £ s. d.	Average per Acre. £ s. d.
1	3¼	38 12 4	11 17 7
2	3½	20 9 0	5 16 10
3	3½	53 1 7	15 3 3
4	4	22 16 2	5 14 0½
5	5½	42 2 4	7 13 1
6	4	36 12 3	9 3 0¾
7	1¾	14 15 2	8 8 8
8	2	20 13 5	10 6 8½
9	2	18 6 1	9 3 0½
10	1¼	14 0 6	11 4 5

The general average amounted, in round numbers, to £9 9s. per acre. The total expense of producing 1,000 lb. of seed cotton on 1 acre was shown to amount to £3 6s. 4d. from sowing to marketing. This includes £2 1s. 8d. for picking. Assuming that only the farmer and his family picked the crop, the cost of picking as a cash outlay need not be considered, so that a crop which sells for £9 9s. is secured at a cost of £1 4s. 8d., leaving a net profit of £8 4s. 4d. per acre. Even if we add the cost of picking as a cash outlay, the average net profit is yet £6 2s. 8d. per acre. This is quite irrespective of the value of the seed, which is usually worth £5 6s. 3d. per ton, or £1 13s. 2¼d. per acre. To-day the price of seed in the premier cotton-growing country of the world—the United States of America—is £20 per ton.

Never since the Civil War in those States has there been such a magnificent opportunity for the Queensland farmer who is wise enough to plant cotton. We are informed by cable that heavy frosts have destroyed more than half the cotton plants in America, and that, as a consequence, the fields will all have to be replanted, and the numerous cotton-seed oil-mills have closed down, and the owners, instead of making oil, are asking £20 per ton for the seed. Furthermore, we are told that there is a cotton famine in Lancashire in England. Old colonists will remember what happened during the great cotton famine (1866-1874). Cotton has been grown in Queensland for nearly fifty years, but on a comparatively large scale only from 1866 (when 2,884 acres were planted) to 1869 (when the acreage had risen to 14,684 acres), afterwards gradually becoming less until, in 1874, only 4,149 acres were under cotton crops. The price of seed cotton was, in those palmy days, 3d. to 4d. per lb., and ginned cotton in the British market brought from 1s. 6d. for Uplands to 3s. 6d. for Sea Island. With the close of the American war, prices fell to such a low point that Queensland was unable to compete with the United States in the production of the staple, freights and other expenses being very high, and, all cotton being shipped by sailing vessels, the right moment for marketing was often missed owing to the lengthy voyage.

These conditions are all altered to-day. Sailing vessels are a thing of the past, and freights by the numerous large steamships which trade between Queensland and European ports are far below what they were in the old days, so that everything is in favour of the cotton planter of to-day.

The time for sowing cotton is about the end of August in the Southern districts; but, where no frost is to be feared, sowing may take place earlier, and in the Far North, cotton may be planted all the year round. Although we have taken 1,000 lb. of seed cotton per acre as an average crop, it by no

means follows that this is the maximum quantity which may be produced. Now that we have the improved Uplands varieties, it is quite within the mark to expect 2,000 lb. per acre, and, as a matter of fact, this quantity has been picked by several planters, especially in the Central districts. Then, again, within the last three or four years, a heavily-bearing new hybrid cotton has been evolved in the Cairns district by Dr. David Thomatis. There are three varieties of this cotton: the finest, known as "Silk Caravonica," has, we are informed, yielded 3,000 lb. of seed cotton per acre; and Dr. Thomatis stated that the coarser-wool Caravonica produced even more, and sold at 10d. per lb. At 2d. per lb. for the cotton in the seed, such a crop would give the grower a gross return of £25 per acre. Putting aside, however, such large returns, if the farmer can produce 1,200 lb. of seed cotton per acre, and sell it at 2d. per lb., he gets a far better return for his labour than he would by growing maize; and the cotton crop does not require anything like the manipulation necessary in the case of the former. It must be remembered that cotton-growing on a large scale will not be successful in this country owing to labour conditions, but any good farmer can grow and attend to from 10 to 20 acres of cotton, and the picking can be done either by his own family or by contract at ½d. per lb. Pickers, after a little practice, can easily pick from 80 to 100 lb. of cotton a day; and Mr. Daniel Jones, late of the Agricultural Department, instanced an American grower in the Central district who picked, last season, 200 lb. in a day.

COFFEE CULTIVATION IN QUEENSLAND.

By H. NEWPORT, Instructor in Tropical Agriculture.

HANDLING.

If the coffee-tree has been carefully watched up to this time its naturally symmetrical growth will not have escaped attention. The branches, it will be seen, are opposite; that is, they come out in pairs on either side of the stem, and the leaves appear in exactly the same way on the branches.

The coffee-buds from the axils of the existing or previously existing leaves or branches, which are called "eyes." These buds in the bearing season develop spikes or blossoms, and at other times leaves or twigs, which, when young, are known as "flush" or young wood in opposition to the mature or old wood.

The first branches that appear are called primaries (*lit.* first branches), and each pair are alternate in their direction, so that if the first branch of a tree points north its mate or pair would point directly south, but the next pair above it would point east and west, while the third pair would correspond to the first. All subsequent branches as well as leaves are, under normal conditions, always horizontal or nearly so. Any deviation from the horizontal, or curve, being common to all branches, they remain practically parallel throughout their growth, though the angle they bear to the vertical stem may alter at different stages of growth. The branches that grow directly from primaries are called secondaries, and the ones from them in their turn tertiaries. From this wonderful arrangement of nature it will be seen that the coffee-tree is able to bear a series of fan-like groups of branches as it were in layers and without interfering with each other. This constitutes what may be called the normal growth of the coffee-tree or bush, but, while nature starts in a perfectly symmetrical system, there are many causes operating to interfere with the continuance of this symmetry, and to induce, or admit of, abnormal growth. One of these is the operation of topping. This induces the growth of suckers, which are vertical shoots from the stem, and must be dealt with as described under "Suckering" and "Centering." Branches also at times grow either

upward, downward, or backward (*i.e.*, towards the stem of the tree), which, it can be understood, interfere not only with the symmetry of the tree, and by rubbing against other branches, with the bearing of crop, but help to shut out light and air necessary for the fruiting of the branches below, and increase the cost of harvesting or picking by the irregularity of their position. Some of these abnormal branches, more especially those growing upward from a primary, form an independent head, and, for some unaccountable reason, have the power of apparently drawing more than their fair share of sap. These are hence known as "gormandisers," and, if allowed to remain, will develop at the expense of their parent primary branches, and sometimes of the whole tree. Again, it has been found from long experience that if the secondaries or tertiaries are left in pairs—that is, a branch allowed to grow out of each of the opposite eyes, they develop at the expense of the main branch, which will either cease growing or shrink from the point where it emerges between such pairs. Hence pairs are also considered abnormal, and, if strictly not so, are at any rate detrimental to a uniform distribution of sap. On the other hand, where two or more branches appear from one eye—that is, on the same side of a primary—the term pair is not applied

The maiden crop of a young tree is borne mainly on the primaries, and to some extent on the stem itself. Immediately after the rainy season, say in March or April, when the crop is half to three-quarters grown, the now matured wood sends out a flush of young growth which, though the primaries in a healthy tree may bear again, produces the bulk of the next season's crop. This flush will consist of numbers of young branches from each eye, not merely of normal, or the right kind, but abnormal, such as described above—viz., pairs, gormandisers, branches growing upwards, downwards, and backwards, which *must* be thinned and sorted out in order to prevent a thick matted growth that would prevent light and air reaching branches below it or between it and the stem, thereby reducing its crop-bearing capabilities and inducing fungoid and other diseases; to prevent waste of growth and energy of the tree, and to preserve the symmetrical form and arrangement of branches on which, as previously mentioned, depends to a great extent the cost and facility of the picking.

When the growth is young it does not require a knife, but can be quite readily rubbed or pulled off by hand, hence the work is called "Handling." The stem, primaries, and also secondaries are looked upon as the skeleton or foundation of the bearing wood of the tree, and as such their training and the regularity of their growth should not at any time be lost sight of while the tree is still young. The regulation of this annual flush or growth of new wood must be accomplished by some system if it is to be effective and satisfactory. The system adopted requires a knowledge of the style of growth of the tree, and the object to be attained, as well as the exercise of considerable discernment respecting many minor matters, such as the soil, season, health of the tree, aspect of the field, the weather, shade, &c. The object to be attained is the direction of the energies of the tree to the bearing of crop, and the elimination of all wood that will prove useless or detrimental.

The system upon which this may be done is a matter of much controversy among planters, as can readily be understood when so many factors that differ with almost every plantation have to be considered. Nevertheless, the first lesson given to a learner in a coffee-planting district consists generally of the plucking of a leaf, and his being directed to note the arrangement of the veins on the back of it, and to mould his system accordingly. These veins will be found to be alternate, and the basis of the most generally adopted and most successful system is an alternate arrangement of secondary branches on the primaries and tertiaries on secondaries. The next point to remember is that the skeleton branches of the tree must at all costs be preserved, and that while secondaries and other branches may be regrown if removed, primaries never

can be. Hence, never cut a primary unless it be at the tip, and then only if there is a substitute there to take its place. All secondaries growing from the primaries within 6 in. of the stem having been first removed as directed under "Centering," the rest of them should, therefore, be removed from alternate eyes, on the mature wood only, so as to have no pairs, and all the abnormal wood described above be eliminated. If a primary or secondary dies back or breaks, another branch should be trained to as nearly as possible take its place. If this is carefully looked to while the tree is yet young a good sound system of growth will have been inaugurated which will very much simplify all subsequent work in connection with the plantation. During the spring of the year, after the rains, and generally two or three months after the blossom has opened and set, the trees flush, and the handling should be set in hand before the growth has become too big and strong, so that the energies of the tree may be directed to the proper ripening of the crop and maturing of the wood it bears.

The first thing then is to "centre," and the next to go carefully over every branch, and starting from the stem or butt end, remove all the irregular and unnecessary wood. The wood left is then on alternate sides of the primaries and secondaries on the mature wood. At the tips of branches that are still green sometimes lateral branches will make their appearance, but these should always be removed. A well-handled or pruned tree looks as though it had been combed out, all branches, young and old, coming *away* from the center all round it. Sometimes two handlings are done, but this, if possible, while very nice, is expensive, and should not be necessary.

On the regularity of the handling depends the simplicity of the pruning.

PRUNING.

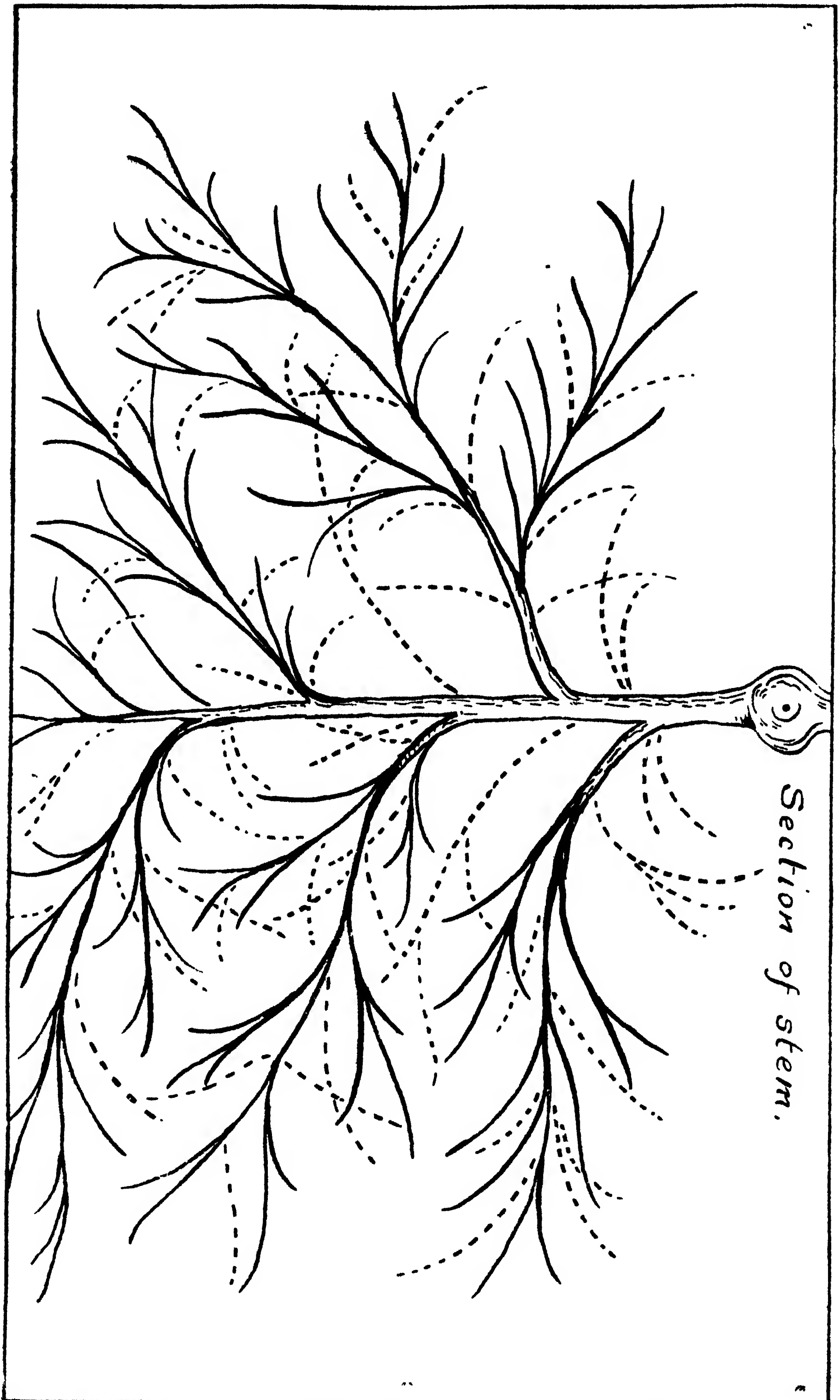
After the handling, the trees should not be touched again until the crop has all been picked off. By that time some of the flush that will have grown after the handling will have become too tough to take off by hand, and also some of the wood that has that year borne will require removal in favour of young wood of greater vitality. Pruning has, therefore, to be done with a knife, secateurs, or some such implement, though the ordinary non-folding hook-pointed knives are best. These should always be kept sharp, so that any wood removed may be by a clean cut without any breaking or tearing of the tissues.

With a fair working knowledge of the requirements of the tree, so far as branches and wood is concerned, the formation of a good foundation or skeleton, as I have called it, can be commenced while the tree is quite young. If this has been done, the plantation will be tremendously benefited throughout its whole life. Pruning is necessary to encourage the growth of new wood as well as lighten the tree of an excess and remove dead or useless wood; and, in fact, direct the energies of the plantation to the sole object of producing suitable wood for the next and following season, and even or uniform crops annually. This should be done, therefore, as soon as the crop is removed from the trees, and, if possible, between that and the opening of the new blossom. Sometimes this is not possible on account of a protracted picking season or an early blossoming, and the pruning may have to be stopped for a week or two while the blossom opens, but it should be continued and completed as soon as possible after any such delays.

The pruning proper will deal mainly with the old wood, though the principles involved are exactly the same as in handling.

As already stated, the primaries and secondaries, constituting as they do the foundation of the tree, should not ordinarily be cut.

As the tree grows older it will be noticed that the tertiaries bear most of the crop, and also that wood that has borne well one season seldom does so the following year, so when in the handling it is seen that a tertiary is



BRANCH OF COFFEE-TREE, SHOWING HOW TO PRUNE.

bearing heavily, its natural pair, on the other side of the mother secondary, may be left to develop, and in the pruning the old tertiary is removed in favour of the new one. If there is a paucity of wood two tertiaries are sometimes left growing in the same eye—*i.e.*, on the same side of a secondary, but never more than two. The tertiary and subsequent branches it will be seen are constantly changing therefore. Sometimes branches bear so heavily that so much sap is absorbed in forming and ripening the berries that insufficient is left to develop the branch itself; such wood is thinner than ordinary, and is known as a "whip." If these are left they bear a few berries only at the tip, if at all, and hence are not considered worth retaining, and so are removed in the pruning.

Dead wood should be broken rather than cut. Occasionally—generally towards the end of primaries or secondaries—a thick knot of wood is formed at or over an eye, usually due to a bad cut when pruning, and this knot will, instead of sending out not more than five or six shoots as most eyes do at most, will produce scores pointing in all directions. These knots are known as "crows' nests," and the branch bearing them had best be cut right off just below the nest. Any attempt to prune out crows' nests is not worth while, and is seldom effective.

It is impossible to give a comprehensive description of pruning in limited space and without numerous diagrams. The one illustration cannot show everything, but if carefully studied in conjunction with above remarks will materially help toward a fair understanding of the subject. The almost instinctive decision, quickness, and ease of operation can only be obtained in this as in all things by practice.

The sketch is of a bird's-eye view of a coffee-tree primary; consequently, while showing by firm lines the secondaries, tertiaries, &c., which are required for crop bearing, and how they lie in one plane, the wood that grows upward or downward cannot be indicated. Also, the branch indicated in the drawing is of an old tree—young trees will have much less wood than is depicted there. The dotted lines show the wood that must be removed. The various abnormal growths such as gormandisers, pairs, crow's nests, whips, &c., though not illustrated, will be readily recognised in the course of pruning a field.

At first the operation will be found woefully slow, but once the stage where one has to stop and think over each cut has passed, it will be found not only more easily and quickly done but one of the most interesting of field operations, the pruning of coffee being quite different to that of almost any other fruit tree. Very heavy pruning should be avoided, as being generally expensive and unnecessary, inducing the growth of gormandisers, and, it is said, by weakening the tree, exposing it to possible attacks of insect pests. Too light pruning, on the other hand, is apt to induce fungoid pests.

It is not always possible to prune according to rule of thumb, but while it is necessary that the work should be intelligently done the system should be followed as nearly as practicable. It must be borne in mind that as the pruning arranges for the right-growing and good-bearing wood for the season following, the effect of a good, bad, or indifferent pruning will be shown in the season next after rather than immediately following the work.

PRUNING OLD COFFEE.

The foregoing deals with young plantations as well as such as may be considered mature—*i.e.*, from five to ten or even twenty years old. In pruning plantations older than this, especially if the stems of the trees have become gnarled and knotted with age, the strict adherence to the system must be relaxed somewhat in favour of the encouragement of good wood wherever it may be produced under the lessening vitality of the tree. Such trees will sucker less and make less wood generally, but the air funnel down the stem

must be kept clear by centering, while gaps caused by broken or dead primaries will have to be filled in by wood from neighbouring branches that in younger trees of greater vitality would be considered quite irregular because unnecessary.

Fields and plantations that have been abandoned or neglected may be brought into good form again, but must be judiciously and carefully pruned. The drastic pruning that would be necessary to bring them into the correct shape at once would involve reducing them to "parrot poles"—*i.e.*, little more than bare primaries, and give them such a shock as to render them useless as crop-producers for some years if not kill them right out. Such old coffee must first be carefully suckered and centered, for which the pruning-saw will often have to be brought into requisition where the suckers, &c., are too thick and strong for the knife. This much, with the breaking off of dead wood, is often enough for the first year's pruning. In the second season more of the cross wood and unnecessary secondaries may be removed, and the trees brought into thorough shape finally by about the third season. The disastrous effect of a sudden heavy pruning to old or neglected trees has often been used as an argument against pruning at all, though it is really only an argument against pruning without exercising common sense.

THE SYSTEM OF NO PRUNING.

During the last ten or twelve years there have been many systems of coffee culture promulgated, which among other things eliminated the process of pruning, and as pruning is somewhat expensive these have received considerable credence. It is admitted, however, that pruning increases the size and improves the quality of the coffee bean. The elimination of this work, on the other hand, does not necessarily involve the immediate deterioration of the trees or reduction of the quantity of the crop. Under conditions where the rainfall is not too heavy, labour is unobtainable or prohibitive in cost, and after the first crop or the fourth year of the plantation this work may be reduced to a merely nominal operation or even eliminated if unavoidable.

This is not advocated, however, and, if done, the centering and suckering must be carefully and regularly carried out all the more strictly. The presence of shade, also, by reducing the natural tendency of the tree to flush so prolificially, reduces also the need for pruning to a considerable extent.

No pruning means also increased cost of picking, on account of the hindrance caused by the presence of a great deal of unnecessary wood, as well as an ultimate reduction of quantity, as well as quality, of the crop by the wealth of foliage on the outside of the tree preventing both flush and cropping nearer the stem, and turning the trees into what are called "umbrella-trees"—that is, trees with only top primaries and outside wood.

While the handling of young trees just so soon as they begin to make wood is urgently advocated, and a subsequent pruning or two after the maiden crop is distinctly advisable, the annual pruning subsequently may be materially reduced or even omitted, and coffee still cultivated with considerable, if not as great, a measure of success. To do no pruning or handling whatever from the commencement, however, would be but to court disaster.

ENSILAGE FROM CANE TOPS.

Mr. E. Ely, of Geraldton, writing to the "Australian Sugar Journal" on the subject of ensiling cane tops, advises:—

First select your best paddock of tops and then cart into a heap, and mix about 7 lb. salt to a load of tops. Pack them as close as you can, and when you have as much as you think sufficient, cover them with a load of dry grass, or trash, and cover the whole with sufficient earth to keep the heat in, the more weight the better. In stacking, keep the stems of the tops inwards

Plate II.

Coffee Tree Unpruned

Same Tree Centered and Suckered.

Plate III.

SAME TREE FULLY PRUNED.

as much as possible. The above is particularly suited to a wet climate, like ours. In drier climates, it will be better to make a hole with plough and scoop and square down the ends. Afterwards cart and mix as above. The ensilage can be put into the hole any way: but much depends on packing tightly; the plan of walking the horse over it as much as possible is by far the best. One need not be afraid of picking up the trash with the tops. When filled, cover as above, and leave for about five or six months: then cut out with a cane knife, and put through the chaff cutter. Do not give the horses too much for a start, and what you do give, mix it with green feed.

Mr. Quodling, acting Principal of the Queensland Agricultural College, to whom the above method was submitted by the Editor of the "Sugar Journal," said:—"The suggestion as to chaffing the ensilage is a good one, and applies particularly when stack silage is made. Where silos or good dry pits are used, then chaffing previous to filling will admit of much better results. We are now chaffing over a ton of ensilage each day, made from panicum, and the stuff is of first-rate quality."

Times of Sunrise and Sunset at Brisbane, 1910.

Date	May.		June.		July.		August.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·17	6 30	5 0	6·39	5·3	6·30	5·18
2	6 14	5·16	6·30	5 0	6 39	5·4	6 30	5 18
3	6·14	5·15	6 31	5 0	6·39	5 4	6·29	5 19
4	6·15	5·14	6 31	5 0	6·39	5 1	6 28	5 19
5	6 15	5 13	6 32	5 0	6·39	5 5	6·28	5 20
6	6·16	5·13	6 32	5 0	6 39	5 5	6·27	5·21
7	6 16	5·12	6·33	5 0	6 39	5 6	6·26	5·21
8	6 17	5·11	6·33	5 0	6·39	5 6	6 26	5·22
9	6·17	5·11	6 34	5 0	6 39	5 6	6 25	5 22
10	6 18	5·10	6·34	4·59	6·39	5 7	6·24	5·23
11	6·19	5·9	6 34	4·59	6 39	3 7	6 23	5·23
12	6·19	5 9	6·35	4·59	6·39	5·8	6·22	5·24
13	6·20	5·8	6 35	4·59	6 38	5 8	6·22	5 24
14	6 20	5 8	6 36	4·59	6 38	5 9	6 21	5·25
15	6 21	5·7	6·36	4·59	6·38	5 9	6 20	5·25
16	6 21	5·6	6 36	5·0	6·38	5 10	6 19	5 26
17	6 22	5·6	6 37	5 0	6 37	5·10	6·18	5 26
18	6·23	5 5	6 37	5 0	6 37	5·11	6 17	5·27
19	6·23	5·5	6·37	5 0	6 37	5·11	6 16	5·27
20	6 24	5 4	6·37	5·0	6·36	5·12	6·15	5 28
21	6·24	5 4	6·38	5·0	6 36	5·12	6·14	5·28
22	6·25	5 3	6 38	5 1	6·36	5·13	6·14	5 29
23	6·25	5·3	6 38	5·1	6 35	5·13	6·13	5 29
24	6·26	5·3	6 38	5·1	6·35	5·14	6·12	5 30
25	6·26	5·2	6·39	5·1	6·34	5·14	6·11	5 30
26	6·27	5·2	6·39	5·2	6·34	5·15	6 10	5·31
27	6·27	5 2	6·39	5 2	6·33	5·15	6 9	5 31
28	6·28	5·1	6·39	5·2	6·33	5·16	6 8	5 31
29	6·28	5 1	6·39	5·2	6·32	5·16	6·7	5 32
30	6·29	5·1	6·39	5·3	6·32	5 17	6·5	5 32
31	6 29	5 0	...	...	6·31	5·17	6·4	5·33

Phases of the Moon.

			H. M.
2 May	☽	Last Quarter	11 30 p.m.
9 „	●	New Moon	3 33 „
16 „	☾	First Quarter	0 13 „
24 „	○	Full Moon	3 39 „
1 June	☽	Last Quarter	8 25 a.m.
7 „	●	New Moon	11 16 p.m.
15 „	☾	First Quarter	2 19 a.m.
23 „	○	Full Moon	6 12 „
30 „	☽	Last Quarter	2 39 p.m.
7 July	●	New Moon	7 20 a.m.
14 „	☾	First Quarter	6 24 p.m.
22 „	○	Full Moon	6 37 „
29 „	☽	Last Quarter	7 35 „
5 Aug	●	New Moon	4 37 p.m.
13 „	☾	First Quarter	0 1 „
21 „	○	Full Moon	5 14 a.m.
28 „	☽	Last Quarter	0 33 „

Chemistry.

DAIRY SALTS.

BY J. C. BRUNNICH, Chemist to the Department of Agriculture and Stock.

Perhaps in no industry the old saying "Only the best is the cheapest," is of such truth and importance as in the Dairying Industry.

In Holland and Denmark, where unquestionably the dairying industry has reached its highest development, legislation forbids the use of inferior articles, and even the salt used in the butter factories has to be of a certain quality.

In order to see how the various dairy salts used in our butter factories compare with each other, some of our inspectors collected samples of the leading brands of the salts for analysis, the results of which are herewith published. Of a few of the salts two samples were obtained and analysed; the analyses agreed very closely, and, therefore, only the best is given in the table. The salts are arranged in acordance with their quality.

	Lym Pure Dairy Salt	Beaver Extra Fine Salt	Mermaid Extra Fine Dairy Salt	Higgin's Fine Curing Salt	Castle Extra Fine Dairy Salt.
Sodium chloride ..	99·83	98·49	98·40	97·71	96·48
Sodium sulphate	Nil	·23	·09	·74	·81
Calcium sulphate .	Nil	·25	61	·53	·65
Magnesium chloride	Trace	·07	·09	Trace	·47
Insoluble matters	·05	·07	·20	·14	·17
Combined water .	·03	·12	·14	·45	·39
Moisture	·09	·77	·47	·43	1·03
Total water . ..	·12	·89	·61	·88	1·12

A study of the analyses will show that Lym salt is practically a chemically pure product, whereas Higgin's curing salt and Castle dairy salt are of much poorer quality, and particularly the latter, containing a large amount of undesirable impurities, like sodium sulphate (Glauber's salt), calcium sulphate (gypsum), magnesium chloride, &c. These chemical compounds give a peculiar bitter flavour to the salt, and must, therefore, influence the quality and flavour of the butter. The amount of moisture, which varies from about $\frac{1}{10}$ per cent. in Lym salt to nearly $1\frac{1}{4}$ per cent. in the Castle salt, is also of importance, because a moist salt on drying inclines to cake and form hard lumps.

Of particular importance is the state of fineness of a salt, and this property is made clear when comparing the micro-photographs of the salts. On the plate showing the photographs of the various salts, the state of fineness can be judged by comparing the salts with a photograph of a piece of wire gauze, with 40 meshes to the inch, taken at the same magnification. It will be noticed that only Lym salt shows in every particle the characteristic cubical crystals of sodium chloride, which all are of fairly uniform size. In all the other salts the fineness is evidently obtained by artificial crushing or pulverisation of the salt, and we find, therefore, fine particles of salt mixed with large irregular lumps. It is easily understood that a salt with a uniform size of particles will go much further when using it for salting butter, than a salt containing large pieces, and, furthermore, will produce a much more uniform salting than any of the coarser salts.

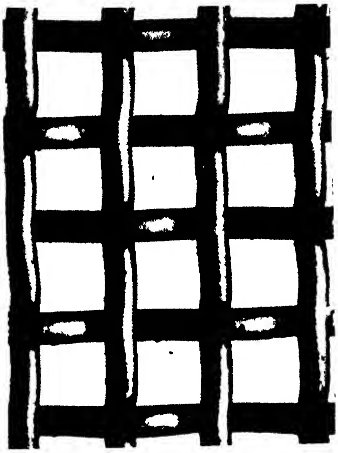
It is very probable that fishiness, which is generally more noticed in salted butters, is due to inferior qualities of salt, containing larger amount

Plate II.

Higgin's Fine Curing Salt.

Beaver Extra Fine Salt.

Lym Pure Salt.



Wire Sieve 40 meshes to the inch.

Mermaid Fine Dairy Salt.

Castle Extra Fine Dairy Salt.

DAIRY SALTS.

of gypsum, used for the salting. One of the causes of streakyness of butter is unquestionably irregular salting, and it is self-evident that irregularly grained salt, dissolving unequally during the working, is likely to cause this trouble.

When we consider that only from 3 to 3½ per cent. of salt are used for the salting of butter, the extra price paid for the best quality will be amply compensated by a better flavoured and better keeping product, and by the fact that less weight of the higher quality salt has to be used. The salt not only imparts the flavour to the salted butter, but it also helps in preserving the butter, and aids in the quicker separation of the buttermilk during the working. For this reason the salt should be added at the earliest stages of the working. During the working the salt gradually dissolves and nearly half of it is lost during the working, so that of the 3½ per cent. originally added only about 1½ per cent. remains, which is considered the most suitable amount for our export butter.

It is hardly necessary to point out that the salt used in butter factories should be stored in dry clean places, and, if possible, kept in double bags, to prevent dirt and dust getting into the salt.

DESTRUCTION OF CANE GRUBS.

In the last issue of the Journal we published the translation of an article from "L'Agronome Tropicale," Brussels, on some methods for the destruction of noxious insects, amongst which was an account of the use of bi-sulphide of carbon, and of noxious vapours forced into the ground and into the nests of white ants by means of a pump.

At a Farmers' Conference held at the Queensland Agricultural College in June, 1897, Mr. J. C. Brünnich, Agricultural Chemist, Department of Agriculture and Stock, said, during a discussion on the destruction of cane grubs, that he had been one of the first in Queensland to make experiments with a view to the destruction of the grub. He had also been one of the first to try the application of bi-sulphide for this purpose, although at the outset he had been hampered by not having the proper apparatus. However, he could now give the farmer a good idea of what it would cost to apply this particular chemical, and it might be added that it was the only satisfactory remedy for the grubs. With the majority of chemicals, when they were strong enough to kill the grub, they were generally strong enough to kill the cane, and, so far as lime was concerned, it was harmless. Bi-sulphide of carbon, however, was a splendid destroyer of grubs, and, if properly used, could be applied with comparatively little labour and expense. When the cane leaves begin to wither, the probability is that grubs are the cause, and if a stool was knocked over, the grubs, generally about fifteen of them, would be found at the foot. A little bi-sulphide applied with a force pump into the earth among them would be sufficient to kill them all. The chemical, though extremely volatile, had the advantage in this case of being very heavy, and this resulted in its staying in the ground instead of rising out of it. A small quantity would kill all grubs within a radius of 2 ft. of the place where it was injected. After the destruction of the grub by this means, the roots of the cane would recover within the course of a couple of months, a network of roots at the foot of the stool would be formed, and the crop would be saved. This remedy could be effectively applied at a cost of from about £2 to £2 10s. per acre. Bi-sulphide of carbon was easily manufactured, and could probably be made on the spot. A good force pump was necessary for its application.

Vegetable Pathology.

POTATO BLIGHT (*PHYTOPHTHORA INFESTANS*).

Professor D McAlpine, in a highly interesting paper on "Some Points of Importance in Connection with the Life-History Stages of *Phytophthora infestans*," published in the "Annales Mycologici" (Vol. VIII., No. 2, 1910), wrote:—

"The discovery of Irish Potato Blight in all the States of the Commonwealth of Australia during the present year (1909) has directed attention to the fungus causing it—viz., *Phytophthora infestans*—and although the lesson has been a severe one for some of the States, it has taught in the most unmistakable manner how dependent the practice of the farmer is on the teachings of science. The science of Vegetable Pathology or the Diseases of Plants has not hitherto received the encouragement in Australia to which it is entitled, from the numerous directions in which it can help the producer, for it is just as necessary to avoid losses as to secure profits in making a commercial success of the business of agriculture.

"There is every reason to believe that the disease had previously existed in Australian potato fields, although supposed to have been discovered for the first time this season. Thus it has been recorded for New South Wales as far back as August, 1846, the year after the terrible epidemic in Ireland, and, in 1893, the Under Secretary of Agriculture for Queensland reported, on the authority of Professor Shelton, that potato blight had appeared there, although only in a mild form. It is interesting to recall that in the neighbouring Dominion of New Zealand there was an outbreak in 1893, but it was of such an apparently harmless character that the growers took no special notice of it, as they attributed the blackening of the leaves to frost, and it was only eleven years afterwards that the disease became so pronounced as to receive official recognition. It is not surprising to find that the disease is already widely distributed in some of the States, for potatoes have been regularly imported from Great Britain, without any attempt at disinfection. Only a short time ago I examined special seed potatoes grown from Sutton's best varieties sent out from England, and some of them were found to be affected with Irish Blight. There is a Commonwealth Quarantine Act in operation now preventing the importation of any diseased plant or parts of plants such as the potato.

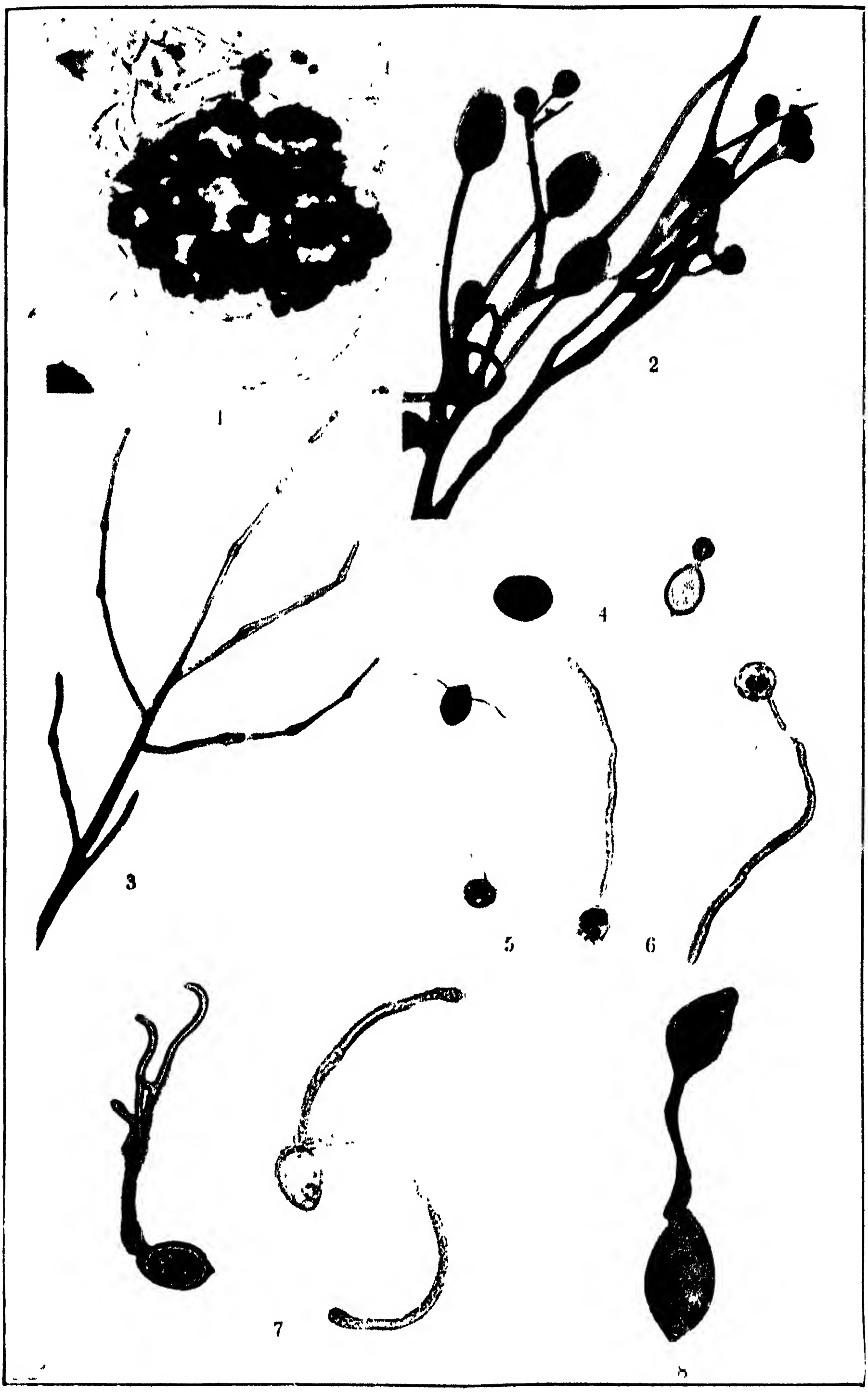
"This disease in the potato has been proved conclusively to be caused by a fungus, and the purely scientific study of its life-history is the basis on which the practical treatment of it is founded. The main object of the present paper is to study the different stages of the fungus, and give the results of experiments to determine the time required in each case to complete their development, as well as the conditions under which they lose their vitality, and it will be shown that these factors have an important bearing on the course of the disease."

After giving the Life-History of the Fungus, Mr. McAlpine summarised his remarks as follows:—

SUMMARY.

The disease of Potato Blight has impressed the popular imagination because it is concerned with an article of diet of daily use and because it may assume an epidemic character very serious in its consequences. It has therefore received special attention at the hands of our legislators, and an attempt has been made to cope with it.

Plate V.



Phytophthera infestans.

It is a splendid example of a plant disease caused by a definite fungus, the life-history of which has been scientifically investigated and measures for dealing with it are based upon these investigations.

The principal points of practical importance are the following:—

1. That the mycelium of the fungus lives in the tuber, and under suitable conditions may develop and spread the disease.

   Hence only clean seed potatoes should be planted, obtained from districts where the disease is not known to exist.

2. That a diseased potato may communicate the disease to a clean potato by contact, either from the mycelium or from the sporangia growing on the surface.

   Hence seed potatoes should be carried in new bags to prevent any possibility of infection.

3. That potatoes and tomatoes are mutually infective, and that the latter, from their succulent nature, spread the disease very rapidly.

   Hence tomatoes should not be grown where diseased potatoes have been, or *vice versâ*.

4. That the fungus may pass through all the stages of its life, from sporangium to sporangium again, in six and three-quarter hours.

   Hence the apparently sudden appearance and rapid spread of the disease.

5. The mycelium may produce a crop of sporangia, under ordinary conditions, in forty-two to forty-five hours, and in the case of tomatoes in about seven hours.

   Hence, to prevent the spread of this fungus from plant to plant by means of sporangia, spraying with Bordeaux mixture may be adopted to prevent their formation.

6. That sporangia have their development arrested by the action of formalin.

   Hence dipping whole seed-potatoes in formalin will destroy any sporangia on the surface.

7. The formation of sporangia may also be prevented by a dry heat of 27 degrees C. (78·4 degrees F.), while a moist heat of the same temperature encourages their formation.

   Hence the disease is not likely to occur in districts where there is a dry heat of this temperature, about the time when the fungus would produce its fructification.

8. Sporangia lose their vitality if kept dry for twenty hours.

   Hence their life is limited, and even if transported by the wind to great distances they must reach their proper host-plant or perish.

9. Zoospores are incapable of germination after being kept dry for twenty-four hours, but they germinate readily in moisture.

   Hence mists and dews are sometimes said to cause the disease, because necessary for the production and germination of zoospores.

10. The mycelium inside the tuber is sterilised where subjected to a dry heat of 48—50 degrees (118·4—122 degrees F.) for four hours, without interfering with the growing power of the potato.

    Hence seed potatoes could be treated in this way, and districts already clean and at a suitable distance from other potato-growing districts could by this means be secured against infection.

Further, special seed potatoes could be imported for trial, even from countries subject to the disease, by submitting the tubers to dry heat and thus destroying any risk of introducing the disease.

EXPLANATION OF PLATE.

Fig. 1. Mycelium in potato-tuber surrounding cell containing starch grains and causing their discoloration. × 150.

Fig. 2. Sporangiophores from surface of tuber bearing sporangia at different stages of maturity. × 300.

Fig. 3. Sporangiophore showing mode of branching and the flask-shaped swellings at intervals, indicating where sporangia were detached. × 300.

Fig. 4. Two sporangia—in one the contents are dividing, in the other the zoospores have escaped and one is shown in front of the opening. × 300.

Fig. 5. Free zoospores, each showing two cilia arising laterally. × 500.

Fig. 6. Zoospores germinating, after coming to rest and dropping their cilia. × 500.

Fig. 7. Conidia germinating, one with two germ-tubes unbranched, the other with one germ-tube giving rise to delicate branches. × 300.

Fig. 8. Conidium producing a secondary conidium instead of a mycelium. The original conidium is emptied of its contents, which are transferred to the secondary conidium. × 500.

WATERPROOFING.

To waterproof cloth, take equal parts of alum, soap, and isinglass; sufficient water. Mode:—Dissolve each of the ingredients separately in sufficient water to make a tolerably strong solution. Then mix all together, and with a sponge thoroughly imbue the cloth on the wrong side. After this, dry the cloth, and then brush it well, first with a dry brush, and afterwards with a brush dipped lightly in a little water.

To waterproof woollen cloth, make after the following manner two solutions in two separate vessels. First, dissolve 1 lb of sugar of lead in 1 gallon of water. Second, dissolve 1 lb of alum in 1 gallon of water. Dip the cloth to be made waterproof first in the solution of lead, and, when nearly dry, dip it in the solution of alum; then dry it in the air or before the fire. This process is very effectual, and it may be used for coats and other garments even after made up.

To restore a waterproof coat, dissolve a handful of best grey lime in half a pail of water, and with this solution wipe the coat at the hardened parts. This should be done twice, at intervals of about four hours. After this treatment a hardened waterproof laid by as useless for years should be equal to new.

To render calico waterproof, a coating of boiled linseed oil containing a little turpentine is a good plan. Another is the alumina soap method. This consists in passing the calico first through a warm soap bath (1 lb to the gallon), then through an alum bath of the same strength, followed by passing the stuff through the mangle. There will be no appearance of any coating, as the alumina soap is in the fibre itself. This metallic soap is excellent for the purpose.

To waterproof canvas, the following is recommended:—Into 1 gallon of rain water stir 1 oz. of sugar of lead and 1 oz. of powdered alum until they are quite dissolved. Let the solution stand till the sediment falls. Then pour off the water and lay the sheet in it for twenty-four hours. This liquid will also render ordinary cloth rainproof. If an oil sheet is no longer waterproof, give it a good coating of a dubbing made by melting 1 part of mutton suet and 2 parts of beeswax. When these are thoroughly mixed, apply with a piece of rag.

Black waterproof dressing for wagon or stack covers. Take 1 cwt. of best plack paint (in paste), 3 lb. of powdered litharge, ½ gallon of thick boiled oil, ¼ gallon of hard oak varnish, and 1 lb. of sugar of lead. Thoroughly mix, and thin down to proper consistency with boiled linseed oil. The above dries quickly with a bright surface, and does not crack or blister when exposed to the weather.

General Notes.

THE WORLD'S LIVE STOCK.

Comparatively few people have even a remote idea of the numbers of live stock in the world's supply. It is, therefore, both interesting and useful information on this subject which has been published by an American exchange, giving a good idea of the numbers of live stock in the world, excluding, however, the unknown numbers in such countries as parts of Africa, China, Persia, Afghanistan, Korea, Bolivia, Ecuador, Salvador, &c.

It will be noted that in all classes of live stock, sheep excepted, Australia is not mentioned. We have, however, supplied the omission in respect of cattle, horses, and swine. The rearing of mules and goats is still in its infancy, and that of asses is a negligible quantity.

Sheep seem to be the most numerous of the large animals of the world, with a total of about 580,000,000 head. Australia ranks first, with about 88,000,000; Argentina second, with 67,000,000; United States third, with about 57,000,000; European Russia and Asiatic Turkey each have approximately 45,000,000; Great Britain, with 27,000,000 in 1908, has more sheep in proportion to its area than any other important nation.

The number of cattle enumerated or estimated, about 430,000,000, although smaller than that of sheep, is much more important, owing to their larger size. In total number of cattle, British India ranks first, with about 91,000,000 (including buffaloes and buffalo calves); the United States ranks second, with about 70,000,000; Russia third, with about 36,000,000; Argentina and Brazil each have about 30,000,000, Germany about 20,000,000, Austria Hungary 18,000,000 (in 1900), France 14,000,000, and the United Kingdom 12,000,000. Commonwealth of Australia, 10,180,214. The proportion of the total number of cattle which is beef cattle, work cattle, or milch cows has not been estimated.

The United States is said to be pre-eminent as a swine-producing nation, being credited with approximately 50,000,000 head out of a world supply of less than 150,000,000. Germany ranks second with about 22,000,000; European Russia has about 11,000,000, France 7,000,000, Austria had 5,000,000 in 1900, and Hungary 7,000,000 in 1895. No other country is credited with as many as 5,000,000. Commonwealth of Australia, 754,101.

Horses aggregate about 95,000,000. European Russia and the United States have almost an equal number, between 20,000,000 and 25,000,000 head; Argentina has about 8,000,000, Asiatic Russia is credited with about 7,000,000, Germany 4,000,000, France 3,000,000, the United Kingdom 2,000,000, Austria and Hungary each had about 2,000,000 in 1900 and 1895 respectively. Commonwealth of Australia, 1,871,714

Of the 7,500,000 mules that are estimated in the world more than half are in the United States; no other country is credited with 1,000,000; Spain comes nearest, with about 810,000 in 1907.

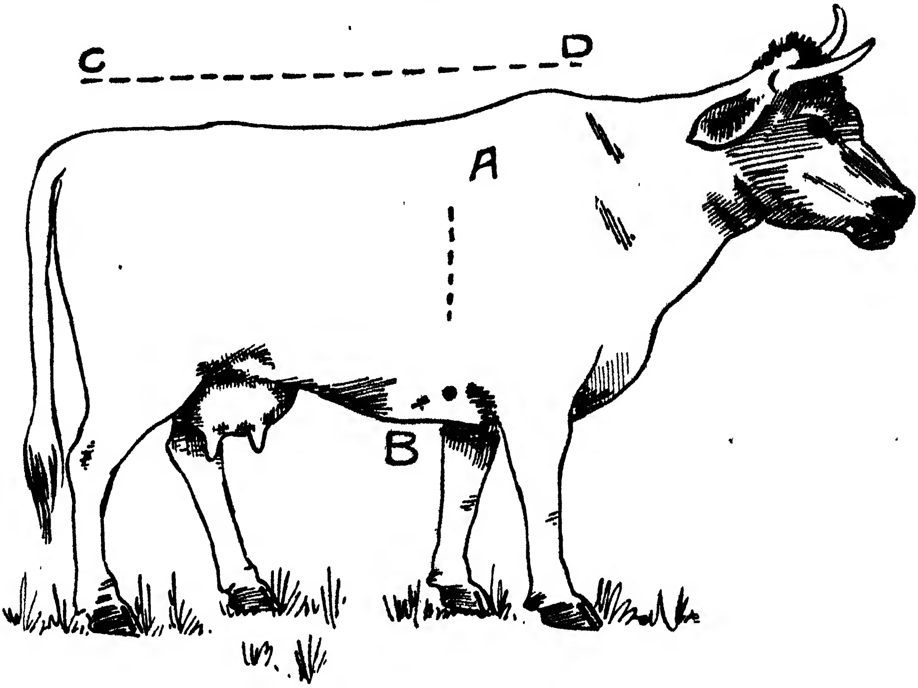
The number of asses in the world is estimated to be between 8,000,000 and 9,000,000; Asiatic Turkey is credited with about 2,500,000; 1,300,000 were credited to British India in 1907; 850,000 to Italy in 1908; and 775,000 to Spain in 1907.

Nearly 100,000,000 goats are estimated in the various countries of the world; by far the largest number are in British India, nearly 30,000,000; Asiatic Turkey is credited with 9,000,000, the Cape of Good Hope with nearly 9,000,000, Algeria about 4,000,000, Mexico 4,000,000, and Argentina 3,000,000 (in 1907).

CATTLE WEIGHTS BY MEASUREMENT.

The "Manchester Weekly Times" gives the following method of ascertaining the weight of live cattle, as here illustrated:—

The method is to multiply the square of the girth by five times the length, and divide the product by 21, this giving the net weight of the animal in imperial stones of 14 lb. For example, suppose the girth of the



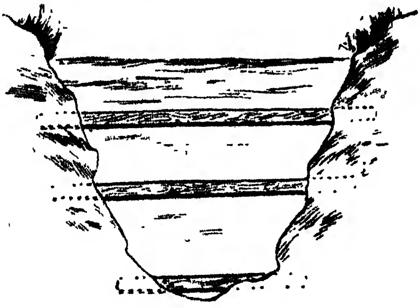
beast, at A B on the sketch, is 7 ft., and the length, C D, 6 ft. The square of seven is 49, which multiplied by five times six, that is 30, gives 1470. Divide this by 20, and the result is 70—the approximate net weight of the animal in stones. This is taking an animal of average fatness. For very fat ones one-twentieth must be added, and with lean cattle one-twentieth deducted. Continuing this system of calculation, if the live weight is known, the dead, or net weight, of the four quarters can be ascertained by multiplying the live weight by decimal .605.

A CHEAP AND EFFECTIVE DAM.

The great cost of building dams of earth, clay, concrete, or any other such material, deters many farmers and others from conserving the valuable water which runs to waste after every rain on land not naturally watered by permanent waterholes or creeks. A very effective dam can, however, be constructed at trifling cost, as is evidenced by one which has been made by a landowner in the Enoggera district. On this land there is a gully about 15 ft. wide and of some depth, down which, in wet weather, torrents of water ran to waste. To retain this water, the proprietor built a dam in the following manner:—

A trench about a foot wide was opened down to bedrock a foot or so below the bed of the gully. In this was placed a dressed log well bedded into each bank. A second and a third log, also bedded about 4 ft.

into either bank, were placed horizontally above the first at intervals of about 2 ft. Then 5-ft. sheets of galvanised iron were utilised to form a wall. The two side sheets were let some little distance into the banks and well rammed with clay. Where the other sheets overlapped each other a long strip of leather about 1 in. wide was inserted between the two sheets, and the latter were then bolted together with ordinary galvanised-iron bolts at 12-in. intervals. When placed upright in position on the timbers, no nails were used except one or two at the top of each sheet. The trench was then filled in with clay and rammed (cement might be used



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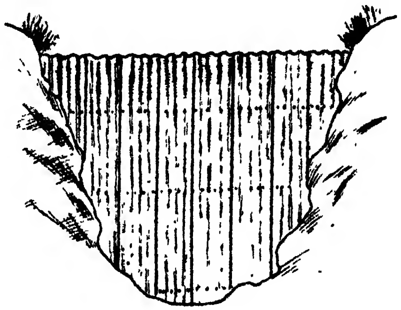


2

if clay is not obtainable), and a water-tight wall, which could not possibly give way owing to the strength of the horizontal beams, was the result. During the heavy rains of June last, this iron wall retained a splendid lot of water, the overplus passing away by a by-wash. No sign of leakage has appeared on the down-stream side. Galvanised iron of good quality will last for many years in water, as is evidenced by our water tanks. Should a track or roadway require to be made over the gully, this could be constructed of earth thrown up behind the dam. In course of time the constant traffic over it would so solidify the earth work that there would never be any occasion to renew the iron.

RING-BARKING.

We have lately received several letters asking for information as to the best time for ring-barking, and in what manner it is to be done so as to avoid the production of undergrowth and growth from the stumps. This is really a matter for the scientific examination of the varieties of timber on the land by the owner. So diverse, says Mr. Maiden, Government Botanist and Director of the Botanic Gardens, Sydney, are local conditions that it is impossible to prescribe with exactness the time for destroying trees in every district. When a man asks us the best time to ringbark a certain tree, we have frequently no precedent to offer him. Because stringy-bark was successfully ring-barked in September, 1889, it does not follow that box may be successfully ring-barked at the same time, or at any other place, in September, 1910. If we could prepare a column of statistics in this way, what a boon it would be! We must consider the tree as a living organism, and give some attention to the physiology of tree-growth.

The first thing is to ascertain when the sap is "up" (to use a rather loose phrase, the meaning of which is, however, well understood), evidence of which is shown by the facility with which the bark strips, and also by the formation of the leaves, to be noted at a distance by their greater greenness. Starch is contained in the sap of a tree. This starch is separated from the sap, and stored up during the period of active growth in the

wood, and especially in the root wood, ready for the formation of buds (usually leaf buds), which buds usually burst in the spring; but the season of bursting forth is exceedingly variable with various trees. Now, many trees, if the bark be injured or ring-barked, have the power of developing the latest buds which exist under the bark, which buds are developed, as above stated, in the root-wood and in the stump. In other words, we have "suckers," those curses of the forester and the pastoralist. The liability of box to sucker has passed into a by-word. So here, I think, we have the key to the problem of ring-barking. If a tree is to be rung, see that the work is done properly—right through the cambium layer all round. Then, see that it is cut at a period when the particular kind of tree operated on has little or no starch or bud-sustaining material left in its roots. In other words, see that it is cut off from its base of supplies. Ring-barking is, in fact, an operation requiring scientific direction, and no landowner should turn a number of men indiscriminately into his property to ring-bark without very cautiously directing their operations.

Thus, it will be seen that different trees have their different seasons of growth, and that, consequently, whilst in a large paddock which has been ring-barked, whilst, say, all the ironbarks are completely killed, the box-trees will throw up suckers, and it is the same with many other trees. So that, as Mr. Maiden points out, owing to the diverse local conditions, and the diverse habits of our forest trees, he would be an unwise man who would authoritatively name a certain season for ring-barking all trees.

YIELD OF COPRA FROM COCOA-NUTS.

An account of trials that were carried out at the Experiment Station, Peradeniya, Ceylon, in order to find out what percentage of copra could be obtained from cocoa-nuts is given in the "Tropical Agriculturist" for January, 1910. The nuts employed were generally small, and, for the purpose of the investigation, 10,000 of them were taken. The results of the experiments were as follow:—

	lb.	per cent.
Weight of nuts	1,284·5	(100.0)
„ water in nuts	163·5	12·7
„ shells	376·5	28·6
„ kernels	753·5	58·7

From the kernels, the weight of dry copra obtained was 337·5 lb.; that is to say, the kernels yielded 44·8 per cent. of their weight in copra. In the same way, the weight of the dry copra was 26·3 per cent. of that of the nuts.

This is expressed differently by saying that 1 ton of cocoa-nuts may be expected to yield 1,315 lb. of kernels, from which 589 lb. of copra will be obtained.

Answers to Correspondents.

HEDGE PLANTS, PRUNING, ETC.

TICK, Bundaberg.—

1. Duranta or Privet.

1*a*. Native Cypress Pine.

2. In pruning persimmons, Mr. J. F. Bailey advises light pruning only, and removal of weak and straggling shoots. No comparison between pruning grape vines and persimmons.

3. Alligator Pear with broken top. Cut out the weaker of the two shoots, but not until about September. The shape of the tree depends upon the cultivator.

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	JUNE. Prices.
Apples (Eating), per case	5s. to 6s.
Apples (Cooking), per case	6s. to 6s. 6d.
Bananas (Cavendish), per dozen	4d. to 4½d.
Bananas (Sugar), per dozen	2d. to 3d.
Cape Gooseberries, per case	4s. 6d. to 9s.
Custard Apples, per quarter-case	2s. 6d. to 3s.
Lemons (Italian), per half-case	...
Lemons (Lisbon), local, per case	1s. 3d. to 3s. 6d.
Mandarins, per half-case	2s. 6d. to 4s.
Mangoes, per case	...
Nectarines, per half-case	...
Oranges (Local), per case	2s. to 2s. 9d.
Papaw Apples, per quarter-case	1s. to 1s. 6d.
Passion Fruit, per quarter-case	2s. to 3s. 6d.
Peaches, per quarter-case	...
Pears (choice), per quarter-case	6s. to 8s.
Persimmons, per gin case	2s. to 3s.
Pineapples (Ripley Queen), per dozen	1s. to 1s. 6d.
Pineapples (Smooth), per dozen	1s. 6d. to 3s.
Pineapples (Rough), per dozen	1s. to 2s.
Plums, per case	...
Quinces, per case	...
Rosellas, per sugar-bag	9d. to 1s.
Strawberries, per tray	2s.
Tomatoes, per quarter-case	1s. 6d. to 2s.
SOUTHERN FRUIT MARKET.	
Apples (Local), choice, per case	6s. to 7s.
Apples (Jonathan), per case	5s. to 6s.
Apples (Cooking), per case	4s. to 6s.
Bananas (Queensland), per case	...
Bananas (Queensland), per bunch	...
Bananas, G.M. (Fiji), per case	13s. to 15s.
Bananas, G.M. (Fiji), per bunch	...
Cocoanuts, per dozen	2s. 6d. to 9s.
Grapes, per box	...
Lemons (Italian), per half-case	10s. to 11s.
Lemons (Local), per gin case	3s.
Mandarins (Thorney), choice, per half-case	3s. to 3s. 6d.
Mandarins (Queensland), Emperor, per bushel case	8s. to 9s.
Oranges (Local), choice, per gin case	4s. 6d. to 5s.
Oranges (Queensland), per bushel case	6s. to 7s.
Passion Fruit (choice), per half-case	4s. to 4s. 6d.
Peaches, per half-case	...
Peanuts, per lb.	5½d.
Pears (choice), per gin case	5s. to 8s.
Persimmons (choice), per half-case	3s. to 3s. 6d.
Pineapples (Queensland), Ripley, per case	5s. to 6s.
Pineapples (Queensland), common, per case	3s. 6s. to 5s.
Pineapples (Queensland), Queen, per case	5s. to 6s.
Plums, per half-case	...
Quinces, per gin case	...
Rock melons, per dozen	...
Tomatoes, choice, per half-case	1s. 6d. to 2s. 6d.
Water melons (Local), large, per dozen	...
Water melons, medium and small, per dozen	...
Strawberries (Queensland), per 3-quart tray	3s. 6d to 4s. 6d.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JUNE.

Article.		JUNE. Prices.
Bacon, Pineapple	lb.	6d. to 8d.
Barley, Malting	bush.	2s. to 3s.
Bran	ton	£5
Butter, Factory	lb.	10d. to 10½d.
Chaff, Mixed	ton	£3 17s. 6d.
Chaff, Oaten (Imp.)	„	£4 15s. to £5 5s.
Chaff, Lucerne	„	£3 15s. to £4
Chaff, Wheaten	„	...
Cheese	lb.	4d. to 7½d.
Flour	ton	£9 10s.
Hay, Oaten (Imp.)	„	£5 15s. to £6
Hay, Lucerne	„	£2 10s. to £3
Honey	lb.	2¾d. to 3d.
Maize	bush.	2s 4d. to 2s. 6d.
Oats	„	3s. 2d. to 3s. 8d.
Pollard	ton	£5
Potatoes	„	£5 5s. to £7 10s.
Potatoes, Sweet	cwt.	1s. 6d. to 1s. 8d.
Pumpkins	„	2s. to 2s. 3d.
Wheat, Milling	bush.	3s. to 3s 9d.
Wheat, Chick	„	...
Onions	ton	£2 10s.
Hams	lb.	11d. to 1s.
Eggs	doz.	1s. 4d. to 1s. 8d.
Fowls	pair	3s. to 4s. 6d.
Geese	„	6s. to 7s.
Ducks, English	„	3s. 6d. to 3s. 9d.
Ducks, Muscovy	„	4s. 6d. to 5s. 2d.
Turkeys (Hens)	„	6s. 6d. to 7s. 6d.
Turkeys (Gobblers)	„	9s. to 13s. 6d.

ENOGGERA SALEYARDS.

Animal.	MAY. Prices.
Bullocks	£8 5s. to £9 2s. 6d.
Ditto (single)	£10 5s.
Cows	£5 15s. to £6 12s. 6d.
Merino Wethers	18s. 9d.
Crossbred Wethers	20s.
Merino Ewes	12s. 6d.
Crossbred Ewes	16s 3d.
Lambs	12s.

Farm and Garden Notes for August.

This and the following two months are about the busiest periods of the year so far as work in the field is concerned; and the more activity now displayed in getting in the summer crops, the richer will be the reward at harvest time. Potatoes should be planted, taking care to select only good sound seed that has sprouted. This will ensure an even crop. Yams, arrowroot, ginger, sisal hemp, cotton, and sugar-cane may now be planted. Sow maize for an early crop. If the seed of prolific varieties is regularly saved, in the end it will not be surprising to find from four to six cobs on each stalk. This has been the experience in America, where the selecting of seeds has been reduced to a fine art.

In choosing maize for seed, select the large, well-filled, flat grains. It has been shown that, by constantly selecting seed from prolific plants, as many as five and six cobs of maize can be produced on each stalk all over a field. A change of seed from another district is also beneficial. Sow pumpkins, either amongst the maize or separately, if you have the ground to spare. Swede turnips, clover, and lucerne may be sown, but they will have to contend with weeds which will begin to vigorously assert themselves as the weather gets warmer; therefore keep the hoe and cultivator constantly going in fine weather. Tobacco may be sown during this month. If vines are available, sweet potatoes may be planted towards the end of the month. In this case also it is advisable to avoid too frequent planting of cuttings from the old vines, and to obtain cuttings from other districts. If grasses have not yet been sown, there is still time to do so, if the work be taken in hand at once. Sugar-cane crushing will now be in full swing, and all frosted cane in the Southern district should be put through the rollers first. Plough out old canes, and get the land in order for replanting. Worn out sugar lands in the Central and Northern districts if not intended to be manured and replanted will bear excellent crops of sisal hemp. Rice and coffee should already have been harvested in the North. The picking of Liberian coffee, however, only begins this month. Collect divi-divi pods. Orange-trees will be in blossom, and coffee-trees in bloom for the second time. As this is generally a dry month in the North, little can be done in the way of planting.

Kitchen Garden.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown which will keep the market gardeners busy for some time: Carrots, parsnip, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

Flower Garden.—All the roses should have been pruned some time ago, but do not forget to look over them occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragon), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall 2·63 in., and for September 2·07 in., increasing gradually to a rainfall of 7·69 in. in February.

Orchard Notes for August.

THE SOUTHERN COAST DISTRICTS.

The remarks that have appeared in these notes during the last few months respecting the handling and marketing of Citrus Fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible, so that the orchards can be got into thorough order for the Spring growth. All heavy pruning should be completed previous to the rise in the sap; and where Winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with the lime and sulphur wash.

Where there are inferior sorts of seedling citrus trees growing, it is advisable to head same hard back, leaving only the main trunk and four or five well balanced main branches cut off at about 2 ft. from the trunk. When cut back give a good dressing with the lime and sulphur wash. Trees so treated may either be grafted with good varieties towards the end of the month or early in September; or, if wished, they may be allowed to throw out a number of shoots, which should be thinned out to form a well balanced head, and when large enough should be budded with the desired variety.

Grafting of young stock in nursery, not only citrus but most kinds of deciduous fruits, can be done this month. It comes in useful in the case of stocks that have missed in budding, but for good clean grown stocks I prefer budding.

In the case of working our Seville orange stocks to sweet oranges, grafting is, however, preferable to budding, as the latter method of propagation is frequently a failure. The Seville stock should be cut off at or a little below the surface of the ground. If of small size, a single tongue graft will be sufficient, but if of large size, then the best method is the side

graft—two or more grafts being placed in each stock, so as to be certain of one taking. In either case the grafts are tied firmly in place, and the soil should be brought round the graft as high as the top bud. If this is done, there will be few missed, and undesirable Seville stocks can be converted into sweet oranges.

In selecting wood for grafting, take that of the last season's growth that has good full buds and that is well-matured—avoid extra strong, or any poor growths.

Seville oranges make good stocks for lemons. In case it is desirable to work them on to lemons, it is not necessary to graft below ground, as in the case of the sweet orange, but the stock can be treated in the same manner as that recommended in the case of inferior oranges—viz., to head hard back, and bud on the young shoots.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the trees' use during Spring. This is a very important matter, as Spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop, to a greater or lesser extent.

Where necessary, quickly-acting manures can be applied now. In the case of orchards, they should be distributed broadcast over the land, and be harrowed or cultivated in; but, in the case of pines, they should be placed on each side of the row, and be worked well into the soil.

The marketing of pines, especially smooths, will occupy growers' attention, and where it is proposed to extend the plantations the ground should be got ready, so as to have it in the best possible condition for planting, as I am satisfied that the thorough preparation of the land prior to planting pines is money very well spent.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and plant them in well and deeply worked land, leaving the top bud level with the surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is often done. You only want one strong shoot from your cutting, and from this one shoot you can make any shaped vine you want. Just as the buds of the vines begin to swell, but before they burst, all varieties that are subject to black spot should be dressed with the sulphuric acid solution—viz., three-quarters of a pint of commercial sulphuric acid to one gallon of water; or, if preferred, this mixture can be used instead—viz., dissolve 5 lb. of sulphate of iron (pure copperas) in one gallon of water, and when dissolved add to it half a pint of sulphuric acid.

TROPICAL COAST DISTRICTS.

Bananas should be increasing in quality and quantity during the month, and though, as a rule, the fruit fly is not very bad at this time of the year, still it is advisable to take every care to keep it in check. No over-ripe fruit should be allowed to lie about in the gardens, and every care should be taken to keep the pest in check when there are only a few to deal with, as, if this is done, it will reduce the numbers of the pest materially later on in the season. The Spring crop of oranges and mandarins will be now ready for marketing in the Cardwell, Tully, Cairns, and Port Douglas districts. For shipping South see that the fruit is thoroughly sweated, as unless the

moisture is got rid of out of the skins the fruit will not carry. Should the skins be very full of moisture, then it will be advisable to lay the fruit on boards or slabs in the sun to dry; or, if this is not possible, then the skin of the fruit should be artificially dried by placing same in a hot chamber, as the moisture that is in the skin of our Northern-grown citrus fruits must be got rid of before they will carry properly.

Papaws and granadillas should be shipped South, and the markets tested. If carefully packed in cases holding only one layer of fruit, and sent by cold storage, these fruits should reach their destination in good order. Cucumber and tomato shipments will be in full swing from Bowen. Take care to send nothing but the best fruit, and don't pack the tomatoes in too big cases, as tomatoes always sell on their appearance and quality.

SOUTHERN AND CENTRAL TABLELANDS.

All fruit-tree pruning should be finished during the month, and all trees should receive their winter spraying of the lime and sulphur wash.

All new planting should be completed, orchards should be ploughed and worked down fine, and everything got ready for Spring.

In the warmer parts, grape-pruning should be completed, and the vines should receive the Winter dressing for black spot. In the Stanthorpe district grape-pruning should be delayed as late as possible; so as to keep the vines back, as it is not early but late grapes that are wanted, and the later you can keep your vines back the better chance they have of escaping Spring frosts.

Towards the end of the month inferior varieties of apples, pears, plums, &c., should be worked out with more desirable kinds; side, tongue, or cleft grafting being used. In the case of peaches, almonds, or nectarines, I prefer to head back and work out by budding on the young growth.

Agriculture.

ENSILAGE STACKS.

The following letter has been received by the Under Secretary for Agriculture and Stock from Mr. Frederick Hurley, Richmond Farm, Degilbo:—

I have the honour to advise you *re* my ensilage stack as erected according to your instructions received in the latter part of last year. I may state I am highly pleased with the experiment, and everyone who has seen the silage has admitted it is splendid stuff. When my two sons and myself commenced building the stack, my neighbours, in most cases, looked upon it as a fad, and the best consolation I got was: If it turns out all right, it is a good thing. We planted 3 acres of maize in August last, in drills 3 ft. apart and fairly close, so that it yielded a very fair crop on scrub soil, the stalks being as thick as a man's finger and bearing a small cob. This was cut at Christmas, when the bottom leaves were turning yellow, and stacked transversely in two stacks jammed well into one another. In the centre of each stack we placed, perpendicularly, a piece of ordinary down-piping, so that we were enabled to take the temperature when we pleased. In one stack the dairy floating thermometer, lowered with a string into the pipes, recorded on an average about 140 deg. Fahr. Strange to say, the other stack reached as high as 150 deg. When we weighted with a few slabs, the temperature fell to about 130 degrees, and remained so for about three months, and then gradually cooled off. The continued dry spell which we experienced compelled me to open the stack for my milkers before I intended to do so, and in the early part of May I commenced feeding. I was afraid the whole business was as my neighbours anticipated, as I could not get our cows to look at it when chaffed up. I tried them for two mornings without success; in fact, they would not touch it. The third morning was the same, so I decided to shut them up all day without food, but even their hunger did not effect the desired end. However, next morning, after grazing all night, they ate a little when mixed with chaff, about half and half. They have now found out it is better than dry grass, and are exceedingly eager for it. It is nearly black and very juicy, being a little tart, but possessing a particularly nice smell; and the stock, to all appearance, seem to eat it with great relish, cleaning up their feed boxes to the last bit.

As to its value from a dairyman's point of value—*i.e.*, cream production—I am not yet able to form an opinion, for the simple reason that the cows we are now milking are from four to six months in calf, and my experience as a dairyman is that, when cows get to that stage in calf in winter, nothing will bring them up in their milk. Nevertheless, although we have had some sharp frosts, they have not gone off, although they are only fed once a day as yet. When more cows come in next month, I intend feeding 40 lb. of silage per day; and, should you care to know the result, I shall be pleased to supply particulars.

I have another stack of maize now curing, and when that is ready I intend to feed in conjunction with mangels. I may state further that the only covering used for the stack was about 3 ft. of dried cornstalks, and no weighting other than that mentioned was used. I find I have not more than a foot of waste at most on the outside. I should not recommend using down-piping, because I find, when removing the silage around the pipe, it is completely eaten through by the acid, so in my next stack I intend using gas-piping.

No haste was used in building stacks; we simply built when we were at liberty from milking times.

Should you require any information which I have omitted appertaining to this, I shall be pleased to forward it. I intend making my success as public in this district as possible, as this is the only stack, to the best of my knowledge, attempted them. I can assure you there are many dairymen here who have nothing for their cattle now that the winter is on them, and the best of them only have hay.

I note the article in this month's journal (June) *re* moulds for silos of cement. If you have any information on the matter to offer, I should be pleased to accept it, as my ambition is to have a silo as soon as I have the wherewithal to erect one.

A NEW CORN FROM CHINA.

A small lot of shelled corn, of a kind that is new to this country (U.S.A.), was sent to the United States Department of Agriculture from Shanghai, China, in 1908, and tested the same season. It proved to have qualities that may make it valuable in breeding a corn adapted to the hot and dry conditions of the south-west. The plants grown in the test averaged less than 6 in. [? feet.—Ed.] in height, with an average of twelve green leaves at the time of tasselling. The ears averaged 5¼ in. in length and 4⅛ in. in greatest circumference, with sixteen to eighteen rows of small grains. On the upper part of the plant the leaves are all on one side of the stalk, instead of being arranged in two rows on opposite sides. Besides this, the upper leaves stand erect, instead of drooping, and the tips of the leaves are therefore above the top of the tassel. The silks of the ear are produced at the point where the leaf blade is joined to the leaf sheath, and they appear before there is any sign of an ear except a slight swelling.

This corn is very different from any that is now produced in America. Its peculiar value is that the erect arrangement of the leaves on one side of the stalk and the appearance of the silks in the angle where the leaf blade joins the sheath offer a protected place in which pollen can settle and fertilise the silks before the latter are ever exposed to the air. This is an excellent arrangement for preventing the drying out of the silks before pollination. While this corn may be of little value itself, it is likely that, by cross-breeding, these desirable qualities can be imparted to a larger corn, which will thus be better adapted to the south-west.

The discovery of this peculiar corn in China suggests anew the idea that, although America is the original home of corn, yet it may by some means have been taken to the Eastern Hemisphere long before the discovery of America by Columbus. From descriptions in Chinese literature corn is known to have been established in China within less than a century after the voyage of Columbus. But this seems a short time for any plant to have become widely known and used. Besides, this particular corn is so different from anything in the New World that it must have been developed in the Old World, and for that to happen in a natural way would take a very long time. These ideas are brought out in Bulletin 161 of the Bureau of Plant Industry, which gives also an account of some cross-breeding experiments with the new corn and the changes which crossing produces in the grains the same season.—Exchange.

RYE STRAW FOR HARNESS MAKING.

The "Journal of the Board of Agriculture" for May, England, says:—

"Some difficulty is experienced from time to time in obtaining home-grown rye straw suitable for harness-making, thatching, and mat-making, with the result that considerable quantities of rye straw are imported from the Continent.

The straw for these purposes needs to be specially prepared by combing, and for collar-making it must be of a suitable length, according to the size of the collar required. Rye straw for the latter purpose is principally imported from the north of France, though some is imported from Belgium and Holland. It is hand-thrashed and combed, and made up in 2-cwt. bales. This rye straw is stouter and tougher than the English straw, but its most important characteristic as compared with home-grown straw is its length, which is 5 ft. and upwards. For the largest collars it is essential that foreign rye straw be employed, as English-grown straw is not long enough. A firm of straw dealers informed the Board that for these reasons they never obtained any rye straw for collar-making in Great Britain. In another case, however, specially grown English straw was found satisfactory.

One firm, who use about 150 tons of home-grown rye straw per annum, state that they find it increasingly difficult to obtain straw suitable for their purposes. They consider that the practice of manuring the rye, though increasing the grain crop, has led to deterioration of the straw.

It would seem from the information the Board have been able to obtain that there is an opening for a small trade in this product, but it is necessary that attention should be given to securing a variety with longer and stouter straw than that commonly cultivated, while when produced the straw would need to be hand-thrashed and combed, and packed and tied uniformly. In November of last year the difference in price between imported rye straw intended for collar-making and rye straw used for other purposes was some 30s. per ton, but this difference is not constant, and foreign rye straw was then very scarce. In February of the present year it would appear that Belgian straw could be put on rail in London at £4 5s. per ton, while English rye straw, not combed but in trusses, was £3 2s. per ton. Occasionally the prices approach one another very closely. A suitable straw, long, hand-thrashed, combed, and uniformly packed, might, possibly, be expected to realise £1 10s. per ton more than the ordinary straw.

Some indication of the type of straw which is required in order to compete with the imported produce may be gathered from the following description of the straw produced in the north of France:—

In the departments of the Pas de Calais and the Nord, a considerable portion of the cereal crops is thrashed by hand because the small producers have not sufficient material for a thrashing machine, and also because it is cheaper to employ hand labour, which is available throughout the winter. The principal reason, however, is because the straw which is thrashed by hand is a very much more remunerative article than if it is machine-thrashed. This applies particularly to rye straw, and to such an extent that many large farmers who could easily hire or even own a thrashing machine frequently have all their rye thrashed by hand. The rye in question grows luxuriantly under the favourable conditions prevailing in this district, and has a very strong stem, which frequently exceeds 5 ft. in length.

The straw is placed on the local market in various forms. It may be (1) machine-thrashed, or (2) hand-thrashed: and hand-thrashed straw may be (*a*) combed, (*b*) uncombed, (*c*) pressed into bales with the thin end of the sheaves turned in, (*d*) straight pressed (*i.e.*, entirely unbroken), or (*e*) manufactured in various forms, *e.g.*, stitched into mats, &c.

The straw is combed in a very simple way, frequently merely with the hand, or with a very short-handled wooden rake which is passed several times through the butt end of the sheaf; or the sheaf may be taken by both hands and pulled several times through a row of wooden prongs which, pointing upwards, are firmly fixed to a trestle about 4 ft. in height. The same result is obtained by each method—*i.e.*, the loose sheaths or leaves which surround the stem are removed, as well as any weeds, &c., which may have been cut and bound with the sheaf.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF JUNE, 1910.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Average Test Per cent.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Lubra ...	Grade Jersey ..	17 Mar., 1910	543	4·7	28·73	
Daisy ...	Holstein ...	29 Dec., 1909	663	3·8	28·07	
Lady Sue ...	Grade Holstein ...	4 Apr., 1910	673	3·6	26·92	First calf
Cocoa ...	Jersey ...	12 Sept., 1909	490	4·7	25·93	
Carrie ...	,, ...	26 Feb., 1910	467	4·7	24·61	
Nita ...	Grade Shorthorn .	24 Jan. ,,	527	3·9	22·87	
Ivy .	Jersey ...	4 June ,,	497	4·0	22·21	
Orange ...	Grade Guernsey ...	13 Dec., 1909	471	4·2	22·15	
Gem ..	Shorthorn ...	22 Jan. ,,	485	4·2	21·81	
Lemonade ...	Grade Guernsey ...	25 May, 1910	486	4·0	21·71	First calf
Lerida .	Ayrshire ..	26 Jan. ,,	520	3·7	21·40	
Linda ..	,, .	27 Apr. ,,	466	4·0	20·82	
Rosalie	,, ..	3 Jan. ,,	437	4·0	19·53	
Bluebell .	Jersey .	29 Jan. ,,	441	4·1	19·22	First calf
Md. Calvé .	Grade Shorthorn	18 June ,,	466	3·7	19·18	First calf
Careless ...	Jersey ...	27 Feb. ,,	367	4·6	18·98	
Bliss ...	,, .	5 Oct., 1909	362	4·6	18·72	
Dot ..	Shorthorn ..	1 Nov. ,,	417	4·0	18·63	
No. 112 .	Grade Guernsey ...	25 Dec. ,,	414	4·0	18·49	
Comet .	Grade Holstein	14 Nov. ,,	446	3·7	18·35	
Patch ..	Grade Shorthorn	20 Dec. ,,	427	3·8	18·07	
Royal Lass .	Ayrshire ...	22 Apr. ,,	421	3·8	17·90	First calf
Laura ...	,, .	16 Oct. ,,	411	3·8	17·87	
No. 6 ...	Shorthorn ...	19 Nov. ,,	417	3·8	17·65	
Dewdrop ..	Holstein .	1 Nov. ,,	450	3·5	17·46	
Whitefoot ...	Holstein-Devon ...	2 Oct. ,,	385	4·0	17·20	
Eve ...	Jersey .	1 Nov. ,,	337	4·5	17·03	
Bee ...	,, ..	23 Dec. ,,	343	4·4	16·93	

Fed on 25 lbs. ensilage (panicum) daily and run on natural pasture.

HOW CREAM FOR BUTTER-MAKING PURPOSES SHOULD BE TREATED AT FARM AND FACTORY, AND DETAILS IN THE PROCESS OF BUTTER-MAKING.

(Paper read by Mr. E. Graham, Government Dairy Expert, before the State School Teachers, at the Queensland Agricultural College, June, 1910.)

When cream leaves the separator, all future treatment should be of a character which will enable the butter-maker to turn out an article not only of fine flavour, but one which will retain its good qualities for a considerable length of time.

The keeping quality of butter is of importance, for the export butter of this State does not reach the English consumer until it is about two months old; hence it is plainly evident that, if we are to deliver it on the table in England in a condition which will do this State credit, every possible care must be taken in its handling and treatment before it is manufactured into butter.

It is an old saying, "Given good cream anybody can make good butter"; but, no matter how skilful and careful the butter-maker may be, he cannot

produce a high-class butter from cream that has not been properly treated during the process of ripening. Ripening means allowing the cream to become sufficiently acid that it will yield up its butter-fat readily, and also that it shall be ripe enough to have the characteristic flavour of butter which has been made from what is known as ripe cream.

As the cream leaves the separator it should pass over a cooler, so that it may be cooled to a suitable temperature for ripening purposes—viz., 65 degrees Fahr. This temperature will not be possible on all the dairies in the State, as the temperature of the water available for cooling purposes during the summer months is, as a rule, considerably above 65 degrees Fahr. As, however, every degree of temperature counts, the aim should be to reduce the temperature as much as possible, even though we cannot get the cream down below 75 degrees Fahr. Many dairy farmers working their own separators never trouble to cool their cream in any way whatever, but simply let it run from the separator into a can, where it remains until it is despatched to the factory. Sometimes the can containing this cream is placed under the separator spout again, and a second or third separating run in on the first cream, and, as frequently as not, the various creams are never stirred, the result being that when the cream ultimately reaches the factory the can contains layers of cream of different ages and of different qualities and degrees of ripeness. That the warm cream flowing from the separator on the older and cooler creams already in the can has a detrimental influence on the quality of the lower stratas cannot be denied. Needless to say, this practice is one to be completely condemned.

Every dairy farmer supplying cream should have a cooler and aerator, the conical type being generally the most suitable for farm requirements. The cost of such an appliance is only a few pounds, but the result, if it is intelligently used, should make more than that difference in the monetary returns from the factory in a very short period.

It is not easy to lay down strict rules for Queensland dairying as it is carried on at present, because so many of our dairymen separate their own cream, mostly all working under different conditions and with varying degrees of knowledge, and frequently with different appliances. The following rules, however, should be adhered to as closely as possible by those whose duty it is to attend to the proper ripening of cream:—

First—As stated above, allow the cream to pass over a cooler and aerator as it leaves the separator.

Second—Deliver this cream to the factory as soon as possible.

Third—The butter-maker should grade and reduce the temperature of the cream to a favourable ripening one as soon as possible after it arrives at the factory.

Fourth—He should control the ripening of the cream so that it will be in a proper condition for churning in about thirty-eight hours from the time of *separation*.

Fifth—The cream should be churned when it contains from ·5 to ·6 per cent. of lactic acid.

Sixth—The temperature of churning should be about 52 degrees Fahr. in summer and 56 degrees Fahr. in winter, although some districts may call for variation of these temperatures.

The most perfect conditions for butter-making are those which enable the butter to be made under the same roof as that where the cream has been separated. Owing to the scattered nature of dairying in this State, this method of dairying is not often practicable, the custom being to have one large central factory to which cream is sent by road or rail for distances varying from 1 to 50 miles and sometimes more. With our system of dairying in vogue, it will be readily seen that a strict adherence to the rules laid down cannot be expected.

The third rule, regarding the reduction of temperature to a favourable ripening one as soon as possible after the cream reaches the factory, must, owing to the irregular deliveries of cream, undergo considerable changes according to the stage of ripeness in which it arrives. In the warmer months it is, unfortunately, the common practice for cream to arrive at the central factory considerably over-ripe, and, instead of the butter-maker reducing it to a favourable ripening temperature, his only hope is to reduce it to churning temperature straight away and churn it at first opportunity.

There is one objection to churning the cream on the day it reaches the factory, and that is, although the creams may be ripe or over-ripe, they should be allowed to blend so as to become of a uniform ripeness for some hours before churning takes place; otherwise the loss of fat in the butter-milk will be higher than under proper circumstances of ripening.

The fourth rule, concerning the control of ripening while the cream is waiting to be churned in the central factory, it will be seen, greatly depends on the conditions controlling rule 3; but we will take it that the cream arrives sweet and in good condition at the factory; then the butter-maker should be able to control the ripening, so that he shall be able to say at what time the next day it will be fit for churning.

In order to do this, he should have cream vats which are capable of controlling the temperature, because, though he may reduce the temperature of the cream when it arrives, unless there is some means of regulating the temperature afterwards, it will, during the warm night of a Queensland summer, rise considerably, and the cream may be over-ripe before he is ready to churn it next day. The cream vat generally used in this State contains coils, through which cold brine is circulated, and this is an effective method for reducing the temperature slowly or for keeping the temperature from rising. This, of course, refers only to what is understood as the natural ripening of cream.

The fifth rule—viz., the amount of acid which should be present in cream before it is churned—is a very important one.

Sweet cream can be made into butter: but such butter will not have the flavour demanded by the consumer, besides which, when sweet is churned, the process of churning is much more difficult and occupies considerably more time, also the percentage of butter-fat which passes away in the butter-milk is very much higher than when sour cream is churned. Butter-makers who have had considerable experience are able to tell by the appearance, taste, and condition of the cream, with a fair degree of accuracy, when it is ready for churning; but anyone not accustomed to butter-making will not be able to judge the amount of acidity present by such observations. For the purpose of determining when cream is ripe, I should strongly recommend the adoption of what is frequently termed the alkali test for acidity. This test is extremely simple, and consists in nothing more than measuring with a burette the amount of a soda solution of a known strength which it takes to neutralise the acid present in a given quantity of cream, using an indicator to show when all the acid has been neutralised.

Rule 6 deals with the temperature of churning, and on this point there is considerable difference of opinion. Modern butter-makers show a decided liking for the adoption of low churning temperatures. At one time 56 to 58 degrees Fahr. was laid down as the churning temperature for summer, and 60 to 62 degrees Fahr. as a winter churning temperature.

Closer attention to the amount of butter-fat lost in the churning process has revealed that a larger percentage of butter-fat is lost in the butter-milk when the cream is churned at the higher temperatures than when lower temperatures are used; and it has been shown that a more complete churning can be got without interfering with the texture of the butter, and the butters churned at low temperatures keep better than those churned at high temperatures, one reason for this being the facility for churning the grains into the

proper size without over-churning, as frequently happens when high temperatures are employed, for then the butter often gathers in lumps in the churn and locks in some of the butter-milk which it becomes impossible to wash out.

In addition to the six rules laid down for the treatment of cream, there is one other, perhaps the most important of all—viz., that all cream should be graded or classified on its arrival at the factory.

The cream should be strained before it is allowed to pass over the cooler. There should be distinct vats for the different grades of cream, and under no circumstances should even a gallon of inferior cream be allowed to mix with the cream intended for the making of first-class butter. With sweet cream tainted and untainted, slightly sour cream tainted and untainted, very sour and aged creams, which may carry also foreign flavours, daily arriving at the factory, it is by no means an easy matter to classify or grade the cream so correctly as to ensure that no mistakes have been made. Frequently cream will arrive perfectly sweet and yet contain the germs of injurious fermentations in such numbers that a good butter cannot be made from it, and still the germs may not have been sufficiently long therein to be able to set up their typical fermentation which would enable the factory manager to detect the taint. Under such circumstances his cream may pass in with the superior cream, and when the entire lot has been ripened the whole vat of cream may be tainted.

After grading, the cream is passed over a cooler, where it is cooled to either ripening or churning temperature. It then passes into ripening or storage vats where the temperature is controlled. These vats should be placed in well-lighted and well-ventilated rooms which it is not necessary to cool artificially beyond the fact that the walls might be insulated.

Another method, and, perhaps, the worst conceivable for cooling and storing the cream, is to place the cans containing the cream in a cold dark room and allow them to remain there, without the cream being stirred, until it is cold enough to place in the churn. This takes at least a day, sometimes more.

The errors of this system are—It is the slowest and most expensive method that a factory fitted with refrigerating machinery could adopt; the air in these rooms is fairly certain to be highly charged with germs of an injurious nature which, when the lids are removed from the cream-cans, are deposited into the cream, causing in time taints peculiar to their species. If a cold room is to be used for the purpose of storing cream, there is no valid reason why it should not be provided with windows and a ventilator. Sunlight is a great destroyer of micro-organisms, and it is also a great enemy to dirt.

The cream having been thoroughly ripened, the next step in butter-making is to churn it, having first ascertained that it is of the desired temperature, and that the churn is in a proper condition to receive the cream. What is meant by the proper condition is that the churn should be cool, perfectly clean, and not in any way suffering from the effects of decay. In considering these things you would have to consider the churns themselves, and what may be considered a suitable churn. The desirable points in a suitable churn are—Good wood, which neither imparts any taste to the cream nor will absorb any moisture too readily. For this reason hardwoods are preferable. Frequently softwoods are used for the manufacture of churns. These readily decay, and it is not uncommon to find in factories churns showing large cavities in the sides or ends. It is most difficult, if not impossible, to thoroughly cleanse such churns. The facility for cleansing is not the least important point to consider when selecting a suitable churn. Not only should the churn be so constructed that all corners can be reached with a brush, but it should be so made that when set up for working the floor beneath it can be cleansed daily.

After the cream has been placed in the churn, the first thing to attend to in all closed churns is the ventilation. The churn should be turned slowly six or seven times, and then stopped, opening the lid or ventilator to admit of any gas that has been set free escaping from the churn. Some churns are fitted with an automatic gas escape valve, and then it becomes unnecessary to stop the churn or attend to the ventilation. In the open type of churns, such as the Eavendon and Streamlet, the question of ventilation requires no attention; but in churning cream charged wih gas in a closed churn it will probably be necessary to allow of the gas escaping several times, after which the churn may be allowed to accumulate speed, increasing it as the period of the "breaking" of the cream, as it is termed, arrives; and when the particles of butter have just formed into small grains the speed may be decreased gradually.

The time occupied from the starting of the churn until the cream "breaks" will depend on the ripeness and temperature of the cream as well as on the class and speed of the churn used. The time generally required is from twenty-five to thirty-five minutes. When the butter is about to come, the churn should be stopped, thoroughly washing all cream that may have become deposited on the lid or in the corners so as to secure an even churning. Cold water is also useful at this stage to facilitate the separation of the butter granules from the cream serum. In churning first-class cream too much water should not be added at this stage, or the delicate nutty flavour so much esteemed in fresh butter will be partly washed away. On the other hand, if the cream has been a tainted one it will be a benefit rather than an injury to give it a considerable amount of water, the action of the water being to carry out some of the injurious flavours prevalent in butter churned from tainted cream.

The churn should now be restarted and allowed to run slowly until the butter has gathered into grains nearly as big as a grain of wheat or about the size of No. 3 shot.

The butter-milk is now drawn off, and the butter is ready for washing. Sufficient filtered water should be added to float all the butter, and the churn revolved for a couple of minutes. This water is then discharged from the churn, and fresh water added, again floating the butter in the churn; it should be again revolved, and this water should come away practically clear. If it shows milky, another washing should take place, but this will seldom be necessary. The temperature of water used for washing should not be above 52 degrees Fahr., and if it is somewhat lower, especially in summer, so much the better. The question of how much to wash butter is a widely debated one. The effect of too much washing is to remove the fine aromatic flavours characteristic of freshly made butters. On the other hand, butter intended for export must have all the butter-milk washed from it, for butter-milk is of a nature which is readily acted upon by bacteria, and if remaining in the butter the butter-milk will readily decompose; and by the time the butter reaches England it will, as a result, be materially affected in flavour. Thus a wise policy is to wash butter until the water comes clear away.

After washing, the next step is to salt and work the butter, which two operations are performed at the same time by the aid of a machine termed a butter-worker or butter table. The butter is removed from the churn while it is still in grains, and placed upon this "worker" or "table," care being taken not to put too much on the table at the one time; otherwise there is a liability to have the butter imperfectly worked or perhaps "greased."

The machine is now made to revolve not more than a couple of times to expel some of the moisture, and at the same time press the butter out so that the salt may be evenly distributed over it.

To ensure that all the butter made carries the same percentage of salt is an important matter, unless, of course, a specially salted parcel is desired. The consumer generally demands a uniformly salted butter. This can only be

done by weighing the salt or by having a measure which contains a known weight of salt. The table is now allowed to revolve again, and the process of working in the salt and expelling the moisture begins. A perfect working might be described as one which will do those functions with the least possible amount of friction or working; also, in working butter, it should never be allowed to pass under the roller without being turned, because in this way the same portions of the butter get exposed to the friction, and this, if not prevented, will result in a greasy butter. All working of butter should take the form of pressing, not rubbing.

Butter may be said to be worked when salt is thoroughly mixed with it, and when sufficient water has been pressed out. To do this two methods are in use—viz., that of mixing the salt and finishing the product in one working, and that of adopting the methods of two workings with an interval between sufficient to allow the salt to dissolve. The latter is most favoured in countries where up-to-date butter-making has been made a study.

The advantages of working the butter a second time are:—

(1) It ensures a more thorough mixing of the salt with the butter;
(2) It enables more moisture to be removed from it; and
(3) It enables the butter-maker to do this without spoiling the texture of the butter by making it greasy.

The amount of salt usually found in the butter suitable for export to the London market is about 2 per cent. or slightly less, and rarely, if ever, exceeding 2½ per cent. The common practice is to add 3 to 3½ per cent. of salt to butter intended for export, but in the working of the butter the quantity of the salt becomes reduced by almost 50 per cent. The next process is to pack the butter in boxes, each of which contains 56 lb.

The matter of packing seems simple enough, but at the same time it is one which betrays many errors. Open half a dozen boxes, turn them out, and view the contents from all sides. How many of the blocks of butter will have perfectly smooth faces? Some will have small cavities, some will have large cavities showing in the sides, others will have rounded ends, all showing that unnecessarily large quantities of air have been locked up in the boxes, and this air is not calculated to improve the quality of the butter during the voyage to Great Britain.

In packing butter the main point to attend to is to pack the first piece into the corners of the box, and to pack the sides of the box well throughout. The packing should be done firmly and sharply so as to avoid unnecessary friction, and it should be done with a straight piece of suitable wood of fair weight, which before using should be thoroughly scalded and then allowed to stand for some time in cold water. A greasy packing-rammer means greasy textured butter.

So much for hand-packing. Some factories no longer continue to pack their butters by hand, but have installed packing machines, which do the work satisfactorily and certainly with less friction than did the older method.

The finish and packing of the butter can be carried out in such a manner as to greatly add to the appearance of the produce. Nothing helps to sell butter more than a clean well-made, nicely branded box, especially if, when opened, the packing, finish, and appearance of the butter is good—it is half-way towards the sale before the butter is even tasted.

At one time it was the custom to finish the butter quite smoothly on top, but this required some skill and occupied considerable time to do it nicely. Latterly it has become popular with our factories to impress some form of brand on the top of the butter, which certainly improves the appearance of the package.

The butter box, before filling, should be lined with grease-proof parchment paper of best quality, which has been previously soaked in water containing salt and boracic acid in solution.

If dry parchment is placed on top of the butter, it will stick to the butter and destroy the appearance of the brand when the box is opened. The boxes should be lidded down as soon as possible after being packed. This helps to preserve the butter better than if they are left open for any length of time. It is not wise to place the boxes in a very cold room—say 25 degrees or 30 degrees Fahr.—immediately after packing, especially if the butter has not been worked a second time, because, if this is done, the process of the dissolving of the salt in the butter is liable to be arrested by the intense cold, and when the butter is removed from the storeroom it may be found to have a mottled appearance.

We have followed the cream from the time it flowed from the separator until its conversion into butter, packed ready for sale locally or for exportation to the oversea markets of the world.

PIG-FEEDING.

At the Ohio (U.S.A.) State University, and also at the Illinois Experiment Station and Wisconsin, experiments have been lately made in pig-feeding with the following results:—

An experiment at the Ohio State University showed that the cost of producing 100 lb. of gain from maize was 11s. 10d., while from wheat it was 16s. 8d. At the Illinois Experiment Station an average of sixteen trials at various periods of the year, with pigs varying from 66 lb. to 311 lb. in weight, showed that 5·34 lb. of whole maize were necessary to produce 1 lb. increase in live weight, the pigs gaining about 1·1 per day, a bushel of 56 lb. hence producing a gain of 10 to 11 lb. live weight.

In ten years' experiments Henry found at Wisconsin that there was an average saving of 6 per cent. due to grinding maize to meal for pig-feeding when used with middlings. This means that with maize at 25s. per quarter a saving of 1s. 6d. would be effected by grinding. At the same time, pigs fed on meal make larger daily gains than those given whole maize, fattening, therefore, being more rapid.

Peas provide a most valuable food for pigs, especially when they are used with foods rich in carbohydrates. Numerous experiments have shown that there is a considerable difference between the carcass of a pig fed on pea-meal and that of one which has been largely fed on maize. For example, at the Wisconsin Station pea-meal and maize-meal were compared, and the pigs fed on the former gained 0·837 lb. per day, compared with 0·54 lb. in the case of those fed on maize-meal. The average food eaten for 100 lb. of gain was 495 lb. in the case of pea-meal, and 606 lb. in the case of maize-meal. The nutritive ratios of the two feeds were 1 : 3·18 and 1 : 9·75 respectively. As regards the slaughter test, it was found that the pea-fed pigs were constitutionally quite superior to the maize-fed lot, and in the former there was a better development of muscle or lean meat in proportion to fat, while in the latter there was a marked difference, the carcasses containing a greater proportion of fat, and being soft and flabby in consistency.

ROCKHAMPTON AGRICULTURAL SOCIETY'S SHOW.

MILK AND BUTTER COMPETITION.

Again this year a milk and butter competition was held in connection with the show. Six competitors entered a cow apiece as compared with three entries in 1909. The prizes were £10 10s., £5 5s., and £2 2s., of which £1 1s. was presented by Mr. J. M. Cooper. The competition, as on previous occasions, was carried out on the farms, where the cows were milked in the same bails used every morning and evening and by the same men who usually look after them. A representative of the society attended

the day before to see the cows milked dry and again at the test milkings. The milk obtained at each milking was weighed and samples of the milk were taken for the purpose of ascertaining the percentage of butter fat. The regulations provided that the prizes were to be awarded to the cows that revealed the greatest merit with respect to the weight of milk, the quantity of butter fat, and the ratio of milk to the pound of commercial butter, a point being given for every ten days in milk since calving, deducting the first forty days, but with a maximum of fourteen points; a point for every pound of milk produced at the two milkings; twenty points for every pound of marketable butter indicated according to the Babcock tests with a deduction of ten points each time the fat was below three per cent. They also provided that, in the case of cows obtaining the same number of points, the advantage should be given to the cow that had been longest in milk. The cows were milked between the 2nd and 16th of May in the presence of Mr. H. T. Deighton, Government Inspector of Dairies in the Rockhampton district, who also conducted the tests for butter fat. The results were sealed by Mr. Deighton as soon as they were completed and were made available yesterday by the secretary, Mr. W. F. Shaw, being formally announced, as already stated, by the Governor.

The cows were placed in the following order at the Agricultural Society's show, Rockhampton:—

Messrs. Archer Brothers' Nancy ...	1st
W. E. Higson's Florrie	2nd
Jas. Stevenson's Bessie	3rd
Messrs. Archer Brothers' Violet	4th
J. T. Alexander's Jumper	5th
S. G. Hoare's Primrose	6th

The performances of the several competitors were as follows:—

		Nancy	Florrie	Bessie	Violet	Jumper.	Primrose
		lb.	lb.	lb.	lb.	lb.	lb.
Weight of morning milk	=	19·5	19·0	16·5	16 5	11·0	11·0
Weight of evening milk	=	15 0	12·0	13 5	13·0	6·0	9·0
Total weight of milk	=	34 5	31·0	30·0	29 5	17·0	20·0
Percentage of butter fat in morning milk	=	3·6	3·4	3·8	3·4	5·6	4·4
" " " " " evening milk	=	3·6	3 6	3·2	3·8	6·0	4·0
Commercial Butter from morning milk .	=	0·78	0·70	0·69	0·60	0·70	0·53
" " " evening milk .	=	0·60	0·48	0·46	0·54	0·41	0·40
Total Commercial Butter .. .	=	1·38	1·18	1·15	1 14	1·11	0·93

The points secured by each competitor were

		Nancy.	Florrie	Bessie.	Violet.	Jumper.	Primrose.
		lb.	lb.	lb.	lb.	lb.	lb.
Weight of Commercial Butter	=	27·6	23·6	23 1	22·9	22·2	18 6
Weight of milk	=	34·5	31·0	30·0	29·5	17·0	20·0
Points for time in milk	=	8·5	5·0	4·6	1 0	14·0	0·0
Points deducted for less than 3 per cent. butter fat	=	...	.	...	...	..	..
Total points	=	70·6	59·6	57·7	53·4	53·2	38·6

DAIRY COWS' COMPETITION.

In conjunction with the milk and butter competition there was a dairy cows' competition—that is, a competition for cows giving the greatest weight of milk in two milkings, the milkings in the milk and butter competition to

be also the milkings in the dairy cows' competition. The prizes were £2 2s. and £1 1s.; but the conditions provided that no prize was to be awarded if the weight of milk was under 25 lb. Four competed. The results were as follow:—

Archer Brothers' Nancy, with 19·5 lb. of milk in the morning and 15 lb. in the evening, or a total of 34·5 lb. 1

J. Stevenson's Bessie, with 16·5 lb. of milk in the morning and 13·5 lb. in the evening, or a total of 30 lb. 2

Archer Brothers' Violet, with 16·5 lb. of milk in the morning and 13 lb. in the evening, or a total of 29·5 lb. 3

J. T. Alexander's Hilda, with 13 lb. of milk in the morning and 8·5 lb. in the evening, or a total of 21·5 lb. 4

Results of Butter Competition.

The following points were awarded to the nine competitors for the champion butter prize:—

—	Flavour.	Texture.	Salting.	Total.
Maximum Points	50	30	20	100
Crow's Nest Butter Company (Crow's Nest)	43	30	19	92
Loan and Albert Co-operative Dairy Company (Beaudesert)	42	30	19	91
Rockhampton District Co-operative Dairy Company	41	30	19	90
Warwick Butter and Dairying Company (Warwick)	40	29	19	86
Warwick Butter and Dairying Company (Allora)	37	30	19	86
Silverwood Dairy Factory Company (Terror's Creek)	36	30	20	86
Silverwood Dairy Factory Company (Toowoomba)	36	30	19	85
Silverwood Dairy Factory Company (Warwick)	37	30	18	85
Archer Brothers, Gracemere ...	32	28	17	77

The competition was open to all factories and dairies in Queensland; but only one exhibit could be made by any one factory or dairyman. Each competitor had to lodge a box of 56 lb. of butter, suitable for export, in the store of the Rockhampton Ice and Cold Storage Company, Rockhampton, twenty-eight clear days before the opening of the show. The butter had to be put in a plain white export box without any departure from the ordinary method of preparing or nailing the box, such as using screws or placing any impression or brand on the butter or box. The prizes were a cup of the value of £5 5s. presented by the New Zealand Loan and Mercantile Agency Company, Rockhampton, and a bronze medal. The judges were Messrs. E. Graham and H. T. Deighton.

The points awarded to the five competitors for the salt butter prizes are given below:—

—	Flavour	Texture.	Salting.	Total.
Maximum Points	50	30	20	100
Silver Dairy Factory Company	44	30	19	93
Warwick Butter and Dairying Company (Allora) ..	42	29	20	91
Warwick Butter and Dairying Company (Warwick)	41	29	20	90
Rockhampton District Co-operative Dairy Company	39	28	20	87
Archer Brothers, Gracemere	37	29	19	85

This competition also was open to all factories and dairies in Queensland, and the conditions were the same as for the champion butter prize except that the exhibits had not to be lodged in cold store a month before the opening of the show. The prizes were £2 2s. and £1 1s. The judges were Messrs. E. Graham and H. T. Deighton.

The Orchard.

HOW STRAWBERRIES ARE GROWN IN ENGLAND.

The cultivation of strawberries has of late years greatly extended, and strawberry-growing has become an important industry in certain localities. The area in Great Britain returned as under strawberries alone, or with only a very small admixture of other fruits, on holdings exceeding one acre was 28,815 acres in 1908. Of this total 24,601 acres were in England, the leading counties being Kent, Cambridge, Hampshire, Norfolk, and Worcester.

The industry is a very suitable one for small holders, although considerable initial capital is required. It has been found in Hampshire, where strawberry-growing is extensively carried on, that a man can often make a moderate living from 2 acres of land under strawberries, while in many instances a family may be said to be comfortably provided for on a holding of 4 acres.

Gross returns may be said to lie between £40 and £60 per acre, but may fall as low as £20, while in a favourable season they may rise to as much as £100. Strawberry-growing, however, is attended by considerable risks, and the beginner who is only possessed of a limited capital will find that late frosts towards the end of April or early in May may spell disaster to his crop, and involve the loss of the greater portion of his capital.

SOIL.

Good heavy land, especially if such land has a warm aspect, makes an almost ideal strawberry soil. Heavy land holds moisture well, and does not require so much manuring as land that quickly "dries out." Soil just too heavy for potatoes also makes good strawberry land. Different varieties of strawberries, however, require somewhat different soils; for example, a heavy soil is more suitable for the Paxton than for either Royal Sovereign or the Laxton, as both these varieties produce an excessive amount of foliage in the second and third seasons when grown in a retentive loamy soil, especially if manure has been liberally employed. Though on the whole heavy soils are preferable to light soils, stiff clay cannot be recommended.

Where other conditions are favourable, but the land at first sight seems unsuitable, it would be desirable to test its strawberry-growing capacity by planting a small area as an experiment, for experience has shown that land not possessing any apparent qualifications may in some cases by suitable cultivation be made to yield heavy crops. Many of the strawberry plantations of Hampshire are examples of this, as they have been formed on heath land which was considered unsuitable for ordinary farming.

In forming a new plantation the ground should be thoroughly cultivated by ploughing to a depth of 12 or 15 in., by ploughing and sub-soiling, or by digging and trenching.

MANURING.

Owing to the extent to which strawberries exhaust the land, and to the risk of damaging the bed by subsequent manuring, the soil must be well manured at the outset. As much as 20 to 30 tons of good short dung may be applied per acre when the bed is formed, and 10 tons in the autumn after the second crop is taken. Bone manure may be substituted for the latter dressing, but artificial manures are not in general use.

The cost of farmyard or town manure may be put at about 6s. 6d. per ton, and in addition 2s. per ton for haulage to the ground, and from 2s. to 3s. per acre for spreading, must be allowed, so that the average cost of manuring will work out to something like £9 to £12 per acre.

PLANTING.

Strawberries may be planted either in the autumn or the spring. If planted in a good soil in September or October, a small crop of quite good fruit may be gathered the following year. The importance of this lies in the fact that a small return is obtained a year earlier than if the planting were done in the spring. Many growers, however, consider that September is too early for planting owing to the runners not usually being sufficiently established, and also regard it as undesirable to take a crop the first year. October is probably the must usual time for planting, or else February or March. In planting it is important that the crowns be kept well below the surface of the ground, without being buried. If elevated above the surface, the new roots which are continually forming near the surface will suffer for lack of moisture. The plants will throw out runners in May or June. These may be allowed to remain if the plants are strong ones, but, if the plants are weak and backward, some growers consider that the runners should be removed at once, each plant being allowed to concentrate its energies on the development of the first truss of flowers. On the other hand, backward plants may thrive later in the season, and it is doubtful if the advantages gained by removing runners will pay for the extra labour involved.

The cost of runners varies according to variety and quality, specially layered plants costing from 10s. to 15s. per 1,000, while "runabouts" (ordinary runners) may be bought for 5s. per 1,000. Assuming that there is less waste entailed in the purchase of stocky runners, and that weaklings are often planted in pairs, the average cost of plants per acre is from £4 to £8, 12,500 to 16,000 plants being required for each acre of ground. If planted 2 ft. apart each way, nearly 11,000 plants are required per acre, but the distances between the rows and between the plants in the rows may vary considerably; for instance, rows 30 in. apart, and 12 to 15 in. from plant to plant, are common; while, on the other hand, "Paxtons" and "Nobles" are planted 2 ft. from row to row, and 1 ft. from plant to plant, in which case nearly 22,000 plants per acre are required.

Varieties.—Particulars of some useful varieties of strawberries are given below:—

Bedford Champion.—A large, handsome, richly coloured mid-season fruit. In much favour with growers, as the flesh is firm, and the fruit bears packing and travelling well.

Givon's Late Prolific.—A valuable dark crimson-skinned variety for the last crop. A vigorous and free cropper.

Royal Sovereign.—A large and early variety, of good flavour; excellent for market and forcing.

Sir Joseph Paxton.—A large and prolific mid-season variety, having a good flavour and standing packing well.

Noble.—A large early variety, selling well until others are ready, but soft and bearing packing badly.

The Laxton.—A large, handsome, oval fruit, having a good flavour, but not packing so well as some varieties.

AFTER CULTIVATION.

Pending the arrival of harvest time, a good deal of labour is involved. Where land is infested with weed seeds, and therefore liable to become foul very quickly, three hoeings are often necessary before the crop comes into profitable bearing, and each hoeing may cost as much as £3 per acre, so that the cost of cultivation, including the removal of runners, from the time of planting to the period when the fruit is fit for gathering—on an average about twenty months—will amount approximately to from £9 to £12 per acre. In some cases the charge for this work may be £15 or even £20 per acre. On a small holding, most of this work would be done by the occupier.

Another item of expense is the cost of bedding with straw for the fruit to rest upon. There is no objection to bedding with manure, made with straw, provided it be placed on the ground in early spring in order to allow the rains to wash the soluble constituents into the soil, leaving the sweetened or otherwise blanched portions of the straw for the fruit to rest upon. A large number of growers, however, now use clean barley or oat straw at the rate of from 15 cwt. to 1 ton per acre, the cost of the straw being from 35s. to 40s. per ton, with the additional expense of 8s. to 10s. per acre for laying or bedding it between the plants. A large quantity of medium quality straw is now steamed, baled, and sold for bedding strawberries.

A further annual charge is the cost entailed in cleaning the plantations of weeds, clearing up straw, and trimming plants after the fruiting season is over. The cost of these operations may be put at from 10s. to 15s. per acre.

Life of the Beds.—A strawberry plant is usually at its best in its second year. A crop planted in the autumn of 1909 or the spring of 1910 would thus be at its best as regards quality in 1912. In 1913 the yield would be larger, but the quality would have somewhat depreciated; and it would probably be advisable that the beds should be cleared after this crop has been gathered.

The life of a plantation, however, is largely dependent upon the character of the soil and the amount of manure it has received. On heavy soils plantations are sometimes maintained for a period of five years, although this practice is much less common than formerly, whereas on lighter land three years is the usual limit. No advantage is gained by prolonging the life of a plantation beyond the fourth year, and the more successful cultivators now favour young plantations.

Old beds are often kept for growing strawberries for jam-making.

GATHERING AND MARKETING.

Gathering the Crop.—An average yield of strawberries taken over a series of years may be estimated at 1,000 baskets per acre, each basket containing from 4 to 5 lb. of fruit. Excluding the special prices obtained for the few very early consignments, the price per basket in a good season may be put at 1s. 3d., while in a bad season it falls as low as 10d.; a fair average under all conditions is probably 1s.

The cost of gathering the fruit is an item of considerable expense, and will vary from ¼d. to ½d. per lb., or, on an average, 1½d. per gallon, in addition to which is the expense of carting the produce to rail, freight to market, and salesman's commission.

Marketing.—Where the industry has become extensive, the railway companies usually provide fruit vans for the carriage of the fruit to the large markets, and much may be done in the direction of reducing the cost of transit by small holders combining to send their consignments in large lots.

The varying capacity of baskets and their disposal when empty are matters of some difficulty. In the south of England the slender wicker basket is in common use, but its varying capacity and the difficulty of estimating the exact weight of contents detracts from its usefulness. The buyer also has objected to the trouble of returning the wicker baskets or paying a charge of 2d. in lieu thereof, and a new form of chip basket has been introduced which promises to meet this difficulty. These baskets contain a definite and uniform weight (5 lb.), and it is proposed that they should be sold with the fruit at an inclusive price, a practice largely adopted by the majority of continental growers. The cost of the baskets, which amounts to 1d. each when purchased in 50-gross lots, will, it is claimed, be amply covered by the extra price realised owing to the buyers knowing exactly what weight of fruit they are purchasing. Further, many growers maintain

that the fruit is damaged during transit when packed in the wicker baskets, their rough and irregular interiors bruising the fruit inside; the chip basket, made of smooth light veneer, obviates this difficulty and presents a much safer and more compact form of package.

INSECT AND OTHER PESTS.

Like all other plants which are raised to a high standard of cultivation, strawberries are assailed by a variety of insect pests, among the most prevalent and destructive of which is the wireworm. Where new ground is broken up and not over-deeply trenched, the grubs commence their ravages on newly-formed plantations, and continue to work havoc among the roots so long as the plantations exist. When new plantations immediately succeed old ones, the young plants are often completely destroyed.

The Green Rose-Chafer (*Cetonia aurata*) is also very injurious. As a grub it feeds on the roots, while in the perfect state as a beetle it causes considerable injury to the blossoms by piercing a hole just below the flower buds, causing them to become detached from the parent plant: the stamens of the flower are destroyed by the biting off of the anthers.

The Otiorhynchus Weevils (*O. sulcatus*, *O. picipes*, and *O. tenebricosus*) do considerable damage, the grubs feeding on the roots and the weevils on the shoots and runners.

The Ground Beetles (*Pterostichus vulgaris*, *Steropus madidus*, *Harpalus ruficornis*, and *Calathus cisteloides*) feed at night on the fruits. Occasional damage is done by other beetles and by the caterpillars of some moths.

Slugs and snails are also enemies of the strawberry, both fruit and leaves being attacked.

Eelworms (*Tylenchus devastatrix*, Kuhn., and *Aphelenchus fragariae*, Ritz. Bos.) also cause much loss among strawberries, the former damaging the roots and crown of the plant, while the latter species causes a somewhat cauliflower-like growth and prohibits the proper development of the buds.

Strawberry Leaf Spot (*Sphaerella fragariae*, Tul.) causes dark-brown spots to appear on the leaves. These spots gradually increase in size, becoming whitish at the centre and surrounded by a red margin. The leaf then turns yellow and soon dies, and, as the disease spreads quickly, much injury follows. As soon as the disease is observed, the plants should be sprayed with Bordeaux mixture—10 lb. sulphate of copper and 8 lb. to 10 lb. of lime in 100 gallons of water. Later in the season, after the fruit has been removed, the foliage should be mown, and allowed to dry; the beds should then be covered thinly with straw and burnt over. This may appear a drastic method, but experience has shown it to be highly successful, and followed by a luxuriant growth of healthy and vigorous foliage.

Strawberry Mildew (*Sphaerotheca Castagenei*, Lév.) has caused serious loss to strawberry-growers during recent years. The fungus completely covers the fruit with a dense white mildew, resembling and closely allied to the summer stage of the American Gooseberry Mildew (*Sphaerotheca mors-uvae*). It is usually only observed by the grower on the fruit, but generally occurs first on the under surface of the leaves, where it is not so conspicuous. Growers should be careful not to overlook this point, but to examine the leaves regularly, as it is only at this early stage that remedial measures can be satisfactorily adopted. Where the disease appears, the plants should be sprayed with Bordeaux mixture (*see* above), and a sprayer which will reach the under surface of the leaves should be employed, while the soil should also be wetted. Where hops are grown, great care should be taken to prevent this fungus spreading to the hops, as it causes hop mildew.—"Journal of the Board of Agriculture, London."

LEMON AND CITRON GROWING.

Surprise has been expressed by many people that Italian lemons should be so largely imported into Queensland and the Southern States, and a reason for this has been stated to be that the citrus growers in Queensland only grow rough lemons. This is certainly not the fact. Lemons quite the equal of the Italian fruit are grown at different places in the State, and a proof of their excellence is that a late Governor-General of the Commonwealth imported lemons regularly which were grown at Barcaldine. It is possible that there are growers of citrus fruits who are not well up in the art of curing lemons for market. For their benefit, therefore, we reprint a paper on lemon-growing written for and published in this Journal by Mr. A. H. Benson, late Instructor in Fruit Culture in Queensland, now Director of Agriculture in Tasmania:—

Although the growing of citrus fruits has made steady progress in this State during recent years, the extension of the industry is mainly in the production of oranges and mandarins. The growth of lemons and citrons—for which parts of this State are admirably adapted—has been neglected to a certain extent, so much so that we do not produce enough for our local requirements.

The reason for this unsatisfactory condition in the case of the lemon is mainly due to the fact that in the older citrus-growing districts on the coast this fruit, although the trees crop heavily, is apt to be of poor quality. The fruit grows to a large size; the skin is coarse, thick, often warty or scabby; the pulp is coarse, often gummy; there is a heavy rag, and the juice is of low quality. This is due to climatic and soil conditions, as too much humidity, especially where the soil is at all rich, induces a heavy tree growth and the production of large, coarse fruit. Fruit of this type is difficult to dispose of, as it keeps badly, and both the peel and juice are of inferior quality. This being so, growers have not extended their lemon gardens, as in many cases the fruit has not paid to grow. Given the right soil and climate, however, we can produce lemons of the finest quality, equal to anything now imported, either from the South or oversea, and there should, therefore, be no necessity for us to import a single lemon or a single lemon-peel into this State. My object in writing this article is to show how this can be done—viz., to describe the soil and climate best adapted to the growth of high-class fruit; and, secondly, to describe the method of gathering and handling the fruit, so that it can be kept from times of plenty, when it is hard to dispose of at a profit, to times of scarcity, when it will bring a good price, and take the place of the imported article, as, when we can produce such a fruit, there is no necessity for us to be sending money out of the State that should be kept at home.

The lemon requires a sandy or sandy loamy soil, of good depth, and possessing perfect natural drainage, to be grown to perfection in this State. It does not do where the atmosphere is too humid, but is at its best in a comparatively dry air, provided that there is a sufficient rainfall or artificial means of providing water to supply the soil with the necessary moisture required for the proper development of the tree and fruit, and that the temperature in winter does not fall so low as to cause serious injury to the tree, as it will not stand much frost. Light frosts will kill back the young growth, but not do any very serious damage to the tree, but a heavy frost will kill it down to the ground.

Soils such as I have described may be found in many parts of the State, together with a suitable climate, the following districts being well adapted for the growth of high-class lemons in the Southern part of the State:—

First.—The foothills of the Coast Range and the upper parts of the valleys or watercourses leading up to them: such as the upper parts of Nerang, Coomera, Albert and Logan Rivers on the south coast; the upper waters of the Lockyer and its tributaries, under the Main Range; the sandy loams of the Esk district and Upper Burnett.

Second.—The sandy loams of the Western and South-western Downs, such as are met with at St. George and Chinchilla, where free from frost.

Third.—The sandy loams of Roma, Mitchell, and further west, where free from frost.

In the Central district good lemons can be grown on the sandy alluvial creeks to the west of Rockhampton; on sandy soil in the Emerald district, and throughout the desert country to the west of the Drummond Range, where there is suitable artesian water available for irrigation. This desert country in the neighbourhood of Barcaldine is producing very fine fruit: a sample exhibited at the recent Rockhampton show being equal to anything I have seen in Australia.

The Western soils, both in the South and Central West, are usually of a red colour, they are by no means rich in organic matter or in plant food, but when well worked retain moisture well during a dry spell. With judicious irrigation when necessary, and thorough cultivation, they are, in my opinion, quite equal to the lemon soils of Southern California, if not superior to them; further, they resemble these soils in many respects, but differ from them in one very important consideration—viz., in the matter of cost—as our lands can be purchased for a very small fraction of the cost of the Californian lands. The soils in the Esk district suitable for lemon culture are similar in appearance and texture to these Western soils, but with the more regular rainfall they will grow fine fruit without irrigation, provided the land is well and deeply worked, so that it will retain moisture during a dry spell.

The other soils in the foothills that are suitable for lemon-growing are usually of alluvial origin, of a more or less sandy nature, and not too rich; in fact, too rich soils cause the trees to make an excessive growth and to produce coarse fruit, whereas the poorer soils incline more towards the production of fruit of superior quality. It is not so much a question of variety as of suitable soil and climate, as any good kind of lemon will produce good fruit when grown under the right conditions, whereas the same variety grown under less favourable conditions will run to wood, and produce an inferior article.

The type of fruit that is wanted is of medium size, not exceeding 2½ to 2¾ inches in diameter when fresh, and even then the larger size is better suited for peel than canning.

The skin must be fine, free from blemish, and of a pale-yellow colour. It must be free from acridity, and of a pleasant flavour. The pulp should be of fine texture, full of juice, of a sharp acid flavour, and be as free from rag as possible.

Absence of seed is an advantage, but only if the fruit is of equal merit in every other particular.

For peel, the fruit may be of rather larger size if wished, but the skin must be smooth, bright, and free from blemish, and from ¼ to ⅜ of an inch, but not more, in thickness, so that if the finer and thinner skinned fruit are selected for curing the larger and thicker skinned fruit are suitable for peel: in fact, are preferable to those having the finest skin.

The first thing to know is when to gather the fruit and how to gather it, and this is where our growers, as a rule, go astray. The fruit should always be cut from the tree—not pulled—as soon as it shows signs of colouring; don't let it remain on the tree, as if you do, it will only increase the thickness of the skin at the expense of its bright colour, and will decrease its keeping qualities. Cut it carefully, taking care not to injure the skin in any way; handle it like an egg, as a bruised lemon is a spoilt lemon. Grade it for peel or for curing, and treat the fruit to be cured as follows:—Place it loosely, without bruising, in a well-ventilated case, and stack the cases in a well-ventilated shed for a few days to toughen the skin. The time depends on the condition of the atmosphere, being longer when it is moist and shorter when dry. The object is to dry the surplus moisture from the skin without shrivelling it.

The fruit should then be gone over carefully to cull out any that show signs of injury; the sound fruit should be wrapped in tissue paper and replaced loosely in the cases, which should then be stored in a sweet, dry, cool building, in which an even temperature can be maintained. The fruit should be examined from time to time, so as to remove any that show signs of mould or rotting, and, when required for market, should be rewrapped and firmly packed in cases. Fruit so treated will keep for months in perfect condition, and once cured it will stand a lot of knocking about.

Mr. W. J. Allen, Fruit Expert to the New South Wales Department of Agriculture, who has recently paid a visit to California, describes the method of lemon-curing in vogue there in an article that appears in June number of the "Agricultural Gazette," and, whilst bearing out what I have stated above as regards the gathering and first part of the curing, he states that, when the fruit is to be cured rapidly, it is first graded and cleaned; it is then stacked in the curing-shed and covered with a canvas cover. Such a stack is 10 feet by 10 feet by 20 feet, and space is left at one end to allow of a kerosene stove with three large burners being placed under the cover. Over the stove there is an iron tank, partly filled with water. The heat thus generated keeps the stack at a temperature of 90 degrees Fahr., and this temperature is maintained from one to two weeks, till the fruit is all of a pale-straw colour, when it is graded, packed, and marketed.

This method, according to Mr. Allen, is in common use in California, as all lemons are there cured before being placed on the market. In this State, however, it is not so much a question of rapid curing as curing to keep that is required, though a cured lemon is always better than a fresh lemon for general use, squashes, &c. The illustration of cured and uncured lemons accompanying this shows the type of fruit we want. The uncured fruit was grown near Esk, and the cured fruit, which has been cut nearly four months, was grown near Helidon.

As showing the market that there is for cured lemons in this State, we depend almost entirely on the imported fruit for all our summer requirements —fruit that is grown either in Southern Europe or California, and for which we have often to pay a very high price; whereas we have little sale for our winter fruit, which, were it cured, would, in conjunction with the summer crop, carry us over the hot weather without our having to depend on outside productions.

With regard to lemons suitable for peel, the demand is equally good, as our manufacturers are obliged at present to import something like 100 tons of peel in brine yearly for local requirements, and this quantity of peel would take some 250 tons of fresh lemons to produce; or, allowing 50 bushel cases of fruit to the ton, 12,500 cases of fresh fruit. Our climate is very suitable for the manufacture of peel, and, given a good quality of skin locally grown, there is no reason why we should not be able to compete favourably in outside markets, as we can, and do, manufacture peel of high quality. There is a further advantage in growing the fruit locally, and that is—if produced in sufficient quantity, use can be made of the juice of the lemon, as it pays to extract it, pasteurise it, and put up in bottles for bar, soft drinks, or private use, and would take the place of the imported article now used for these purposes.

Several varieties of lemons are grown in the State, but, for commercial purposes, a good lemon of the Lisbon type is about the best. The common or rough lemon is of no use for peel, and is decidedly inferior for making a squash. The Lisbon lemon does well on either the sweet orange, Seville orange, or common lemon stock; the Seville orange stock, in my opinion, being the best, especially for the warmer and drier parts, on account of its deeper-rooting qualities.

The Citron.

The culture of this fruit in this State has practically been confined to the planting of two or three trees in the orchard, or more often in waste spots, near fences, &c., and has not been taken up on commercial lines.

The reason for this has been due to the fact that there has only been a very limited demand for this fruit in the past, as the quantity of citron peel consumed locally only amounts to a very small proportion of that of lemon or orange.

Now, however, there is a demand for the peel, which is costing our manufacturers 42s. per cwt. c.i.f. in brine, at which rate there is a big profit for the grower.

The citron will grow anywhere in the coastal districts where the soil is suitable for citrus culture, and is one of the hardiest of the family. It will hold its own against grass and weeds, and is often found growing practically wild, without any cultivation or attention whatever. Even under such conditions it bears heavily and produces good fruit, when free from scale, but the tree, when neglected, is often badly infested with red scale. Given reasonable care and attention—such as cultivating the land to keep down weed growth and to retain moisture in the soil, pruning to keep the tree in shape, and cyaniding to keep down red scale—and I am of opinion that we can produce citrons of such quality and at such a price that, instead of our having to import peel for the manufacture of the candied article, we should be able to put up the finished article here at a price that would enable us to compete in the open markets of the world.

Were the trees looked after as described, the size and quality of the fruit would be greatly improved, and the crop that we could grow would be several times greater than that of the citron orchards of Italy or Sicily. We can produce the raw material at a much smaller cost that it can be grown at in Southern Europe, and, therefore, as our climate is so well suited for the manufacture of peel, there is nothing to prevent us getting a good share of the world's market.

There are several good types of citrons growing in the State, of which the lemon-shaped or Knight's citron and the round or Bengal citron are two of the best; but, to insure the best fruit, and the cleanest and heaviest skins, it will be necessary to propagate nothing but the very choicest types. The citron can be worked on the common lemon stock, and should be planted out at from 16 to 20 feet apart each way. This will give room for the trees to spread and provide the necessary root space, whereas when planted closer together the trees become dwarfed, and are mere bushes. For the local trade the fruit may be allowed to turn yellow before it is cut, but once we go in for the manufacture of citron peel for the world's markets the fruit must be cut green, as a thick skin that cures a dark olive-green colour is the one that is most in demand.

CONTROLLING MOISTURE IN BUTTER.

The controlling of moisture in butter is due largely to the temperature of the washing water used at the time the butter is worked. As a general principle, water will stick to soft butter-fat, and it is repelled somewhat by hard fat, so that, if a churning of butter is washed with water a few degrees warmer than the butter-milk and then worked, this will have a tendency to retain a considerable percentage of moisture in the butter. If, on the other hand, the granular butter is washed with water several degrees colder than the granules, and then worked, this treatment will have a tendency to reduce the moisture in the butter. A butter-maker, knowing these general effects, regulates his practice accordingly.

Tropical Industries.

SOIL WASTES IN THE CANEFIELD.

In an address given some years ago at the annual meeting of the Pioneer River Farmers' Association, Mackay, Professor Shelton gave a good deal of advice to cane farmers, much of which, as contained in the following extracts from his address, applies equally well to-day to the industry as it did in 1896.

IMPROVEMENT CHIEFLY THROUGH THE SOIL.

After a careful survey of what may be called the possibilities of the cane-grower, it is impossible to resist the conclusion that to the soil chiefly he may hopefully turn in his efforts at improvement. That peculiar combination of elements and seasons which we call climate affects the growth of crops, perhaps, to an even greater degree than soils; but to-day, as much as in the past, the seasons come and go uninfluenced by man, except indirectly through the practices of irrigation and drainage.

It is not necessary here to point out in detail the steps necessary to be taken in order to bring the cane crop to better and more profitable condition. The work that has been so successfully done in Germany with the sugar-beet and in America with sorghum indicates the course that may be hopefully undertaken with the sugar-cane. We have only to place the canes experimented with under such cultural conditions that there shall be the largest development of sugar in them consistent with healthy growth, meantime carefully selecting for seed those plants which show the widest variation in the direction of the improvement sought.

It is a singular fact that the sugar, which is the object of all the labours of the cane-grower, seem to have little, if any, direct connection with either the nutritive or reproductive functions of the plant. Not unlikely sugar originally appeared in the cane plant as an accident or sport. Certain it is that a large sugar content of the plant is not accompanied by a corresponding tendency to "arrow" or produce seed, but rather the reverse, while the largest and most robust canes are, as a rule, the least productive of sugar. In a sense the cane-grower labours under very considerable disadvantages as compared with cultivators of other crops. The object of the cane-grower's labours is the production of the single element—sugar; all other parts of the plant are offal to him: and the very means employed to invigorate and stimulate the growth of the cane plant tend to diminish the proportion of sugar, or to so involve it with other constituents that the difficulties experienced in separating them (milling) are greatly increased. These facts serve to show some of the difficulties of the cane-grower. All branches of agriculture have their peculiar problems; but I am certain that the task set before the grower of hay, potatoes, or grain is a simple one as compared with that of the sugar-grower. Without attempting in the least to discredit the good work that has been done and attempted for the improvement of the stock of canes, I yet maintain that the labours of the cane-planter are chiefly concerned with the soil: and that, if the character of the canefield is maintained, he may, with ordinary care in the selection of his seed, dismiss as idle all fears of cane deterioration, and to a considerable extent cane disease itself.

INDIVIDUALITY OF SOILS.

Soils in their natural condition vary in all degrees between the very good and very bad, and these distinctions are maintained, I may say, even after they have been artificially improved. A "good soil" is a good soil always, after it has been depleted by bad treatment or even "exhausted."

Such soils rally quickly, responding liberally to renovating treatment in increased cropping power. Again, "poor soils" are always poor, even when rich from artificial manuring, if the seeming paradox may be excusable. These poor lands are often spoken of by farmers as "hungry" soils, and it would be difficult to more fittingly express their condition. Hungry soils, again, like the good, are found with sand, clay, or gravel predominating; even loams and soils of alluvial origin vary greatly in this natural fertility. But, whatever their character in other respects, they agree in giving the lowest returns for manures applied, in parting quickly with artificial fertility, and in possessing low cropping power. Dr. Stubbs, in a bulletin of the Louisiana Experiment Stations, on "Domestic and Commercial Fertilisers," thus refers to the varying effects of fertilisers upon soils of different constitutions, as shown by his own experiments with manures applied to sugar-cane—

"Strong soils are frequently without immediate results from the application of manures, due partly to the fact that in their defective physical condition they liberate annually as much plant-food as the plant can assimilate under the previling conditions of drainage and rainfall. In our sugar belt commercial fertilisers are frequently without immediate results, due to defective drainage and to the further fact that these soils, well tilled, will produce the largest crops which the rainfall will permit. Hence drainage and irrigation are both needed for maximum results with the use of fertilisers in these soils. If the soils be light, manures will nearly always produce their full effect, provided the quantity used be not excessive."

Practical farmers have already learned that often widely different results are obtained from the use of the same fertiliser; these same fertilisers often giving "no immediate results." In short, successful results with fertilisers can only be expected when applied according to the needs and capacities of soils, and where manuring is a part of a system which embraces thorough cultivation, drainage, and even irrigation. The poverty of poor soils in Queensland, as elsewhere, is due to their failure in one or all of the following particulars:—

1. Texture.
2. Chemical composition.
3. Drainage.

With the cane-growers, but perhaps no more than with the cultivator of other farm crops, the first and most elementary consideration is good soil. The richest soil may not always be available to the selector of small means; but nothing less than kindly soil—soil that is capable of fertility and that responds readily to good treatment—ought to be accepted by him. With good soil the cultivator has everything in his power, while bad land is a burden that often outweighs even science allied to energy and capital. Fortunately, a knowledge of chemistry is not required ordinarily to detect the good from the bad in soils. The practical man sees at a glance the full significance of those signs in soils which give the clue to their nature and capacity.

CANE-FARMING AS A PERMANENT INTEREST.

The value of lands depends not altogether upon the uses to which they are capable of being put. Very often the most fertile soils have little value, while comparatively poor lands, under other circumstances, command high prices. Among the influences tending to give added value to farm lands are dense settlement, cropping capacity, and the nature of the improvements put upon lands. It is well, also, to bear in mind that the gulf which separates productive cane lands worth £10 to £30 per acre from grazing lands worth no more than 10s. per acre is neither deep nor impassable. Bad farming, unfavourable seasons, insect depredations, labour difficulties, or the loss of milling facilities are each and all sufficient to bring the best of cane soils to the condition and value of grazing lands in an incredibly short space of time. In a degree

this is true of all branches of farming, but especially it applies to land given over to the growth of the single crop—cane. In every cane-growing district in North Queensland, numbers of these reverted cane farms (now grazing areas) may be seen. The way to increase the general estimate of cane lands is for cane-farmers to show *practically* their own appreciation of them. This is done, in the first place, by conserving or increasing the fertility natural to their lands, and putting permanent improvements upon them. Give to these same soils thorough tillage and added fertility within the limits of profit; under-drain them and put those improvements about the plantation homestead which the world over distinguish the farm home from a stock shed; and we shall have taken the first steps in the direction of giving to cane-farming a hold upon the community that cannot be shaken.

ONE-CROP CULTIVATION.

The cane-grower, with rare exceptions, grows cane alone. We all know the dangers that attend single-crop cultivation; it is the old case of putting all the eggs in one basket. If the season is unfavourable to the one crop, all is lost; whereas, with a variety of crops, one or more are reasonably certain to give profitable returns, even during the worst of seasons. By varied cropping the labours of the plantation are more equally distributed throughout the year, and with several crops or products on hand something will be in demand, even when markets are at the worst. But the single crop is especially a robber of the soil. It constantly takes from the soil one set of elements, and, in the case of crops like cane, not fed to home stock but sold wholly from the farm, gives small opportunity to replace them. If cane were grown in alternation with maize, say—not a scientific arrangement certainly—the corn crop would tend to restore the equilibrium of the soil by taking from it elements not demanded by the cane crop; while each crop permits the accumulation in the soil, during the period of its growth, of those elements particularly needed by the other. This gives in a nutshell the underlying philosophy of that practice in farming known commonly as "mixed husbandry." I find myself constantly asking the question: Is it necessary in cane-farming that cane alone shall be grown? Is the cane-farmer, any more than the wheat or maize grower, necessarily and inevitably tied to the one crop? I find it difficult to believe that he is. The Colonial Sugar Refining Company enforces a clause in its contracts with tenants to the effect that, aside from forages for teams, cropping shall be limited to cane-growing. This stipulation, in my view, tends equally to the injury of the company and its tenants by enforcing single-crop farming with all its attendant evils. If farmers could be induced to grow cane in rotation with two or even one other crop, practice would quickly show in increased yields and profits the correctness of this old agricultural principle. Why should not the planter grow sweet potatoes and other vegetables as well as the fodders and fruits required in his own household? In some districts maize or even hay crops might be grown in alternation with cane, and even pigs might often be kept in numbers upon the plantation as a source of food, and as a valuable means of replenishing the manure heap. Northern planters are constantly purchasing in a large way for their own use a long list of products, from butter to hay, which to the grower would be considered extravagant. In meeting the demands of this home market the planter, not unlikely, will see the way by which he may escape from the hard necessity of growing one crop alone.

There is yet another lesson that the cane-grower will need to learn before the industry reaches an unassailable position. Under the existing system all the thought and labour of the sugar-grower are centred upon the one cash-producing crop. The fact that it is a cash crop is confessedly the taking feature of cane-growing to experienced farmers and to novices alike. This, to my mind, fully exposes the weakness of cane-growing, considered as a permanent cultural industry. Our planters have yet to learn the lesson that

American cotton-planters and wheat-farmers have learned, often through painful experiences, that the crop which gives immediate cash returns, considered alone, is, in the long run, the one which brings the farm and farmer to poverty. The turnip crop has long received recognition as the sheet anchor of British agriculture; but turnips are never included among the things sold from English farms. The immense labour involved in the growth of a crop of field turnips is returned to the farmer with interest by the sheep which consume the roots, and by the great crops of barley and wheat which the sheep feeding has made possible. In like manner clover, in the agriculture of north temperate climates, is reckoned to be the most valuable of crops; but clover is almost never sold from the farm on which it is grown. The clover crop is valuable because of the milk, meat, and manure which clover gives, and because of the crops of grain which clover makes possible. It is a very simple thing to grow a big crop of cane upon freshly cleared scrub land—to harvest and sell the cane at the nearest mill; but to grow uniformly good crops at a profit, year after year, maintaining unimpaired the stamina of the land, and keeping the plantation clear of pernicious weed growths, will call into play the best energies of the practical farmer.

Cane-growing is but a part of the great trade of agriculture, and, like single-crop farming of every other sort, it alone is wanting in the elements of stability. Farming can be no more permanent than the land farmed. When cane-growing, through subsidiary crops and industries, lays hold of all the resources of the soil, the position of the great industry will not be a matter of question.

CROP AND SOIL.

What amount of manure must be returned to the soil to compensate for the loss involved in taking off a crop of 30 tons of cane per acre, supposing that the tops are left upon the land as manure? This query apparently assumes that precisely what the crop removes from the soil should be returned to it in manure. Practice, the world over, is certainly against this assumption. British farmers have long ago learned that the best results are obtained from the use of superphosphates when this fertiliser is applied to turnips, a crop deficient in phosphoric acid; while mineral manures are most useful to leguminous crops (peas, beans, clover, lucerne, &c.) rich in nitrogen, and nitrogenous fertilisers to the grasses which again are not rich in the element nitrogen. A brief study of the following tabular statement will serve to show the demands the cane crop makes upon the soil, as well as the difficulty experienced in attempting to apportion manures to the supposed needs of the crop without considering *the wants of the land*:—

COMPOSITION OF MATURE SUGAR-CANE.

Water	71·0400	Derived mostly from the air.
Sugar	18·0200	
Cellulose	9·5600	
Fatty and colouring matters	0·3500	
Albuminous matters	0·5500	
Silica	0·2064	Derived mostly from the soil.
Phosphoric acid	0·0288	
Sulphuric acid	0·0384	
Chlorine	0·0216	
Lime	0·0480	
Magnesia	0·0312	
Potash	0 0864	
Soda	0·0096	
Oxide of iron	0·0096	
	100·0000	

A 30-ton crop of cane will, I suppose, carry approximately 4 tons of "tops." These my correspondent has determined should be returned directly to the land. This is better far than burning, although he would have done still better with the refuse of the canefield by applying it as a manure, after feeding it to stock. A simple arithmetical calculation shows the total withdrawals from the soil of valuable manurial substances made by a 30-ton crop of cane, as follows:—

Nitrogen	58 lb.
Phosphoric acid	19·34 lb.
Potash	58 lb.

The 58 lb. nitrogen are contained in 350 lb. of nitrate of soda, or 280 lb. sulphate of ammonia.

The 19·34 lb. phosphoric acid are contained in 42·21 lb. of phosphate of lime, or 110 lb. dissolved bone.

The 58 lb. potash are contained in 167 lb. sulphate of potash, or 446 lb. kainit.

If, therefore, we give to our canefields, yielding 30 tons of cane per acre, an annual dressing of 280 lb. of sulphate of ammonia, with 110 lb. of dissolved bone, and 167 lb. of sulphate of potash or 446 lb. of kainit, we shall have exactly recouped the land for its losses due to a single crop of cane. We shall have really done something more, for the dissolved bone contains from 2 to 3 per cent. of nitrogen, for which allowance has not been made in this calculation. It is certain that no one having a practical acquaintance with manures for the cane crop would for a moment think of applying this formula in ordinary field operations. The amount of nitrogenous fertiliser is excessive in itself, and, judged by recognised standards, out of proportion to both the phosphoric acid and potash. This large annual dose of nitrogen would, in large part, be lost to the cane in drainage water, and its chief effect upon the crop would be seen in an excessive growth of hard milling cane, having a low sucrose content. The amount of nitrogen, as already shown, is far too great, the phosphoric acid is quite as much too small, while the amount of potash is certainly beyond the requirements of most cane soils in Queensland.

But the most serious difficulty experienced in attempting to apportion manures exactly to crop demands grows out of the fact that for a given plant, under like conditions of maturity, the mineral constituents are found in about the same relative proportions, whatever the soil may have been. It has been found, for instance, "that Virginia tobacco grown in the Royal Botanical Society's Gardens in London presented precisely the same composition as that grown in America, so that neither change of soil nor of climate had influenced the relative proportions of mineral matter and organic matter, nor those of the principal ingredients : the plant had taken from the soil of London the same materials, and in the same relative proportions, as from the soil of Virginia." If, therefore, the demands of the cane crop alone can be considered, then we must give one invariable manuring regardless of varying climatic conditions and still more varying soils.

EXPERIMENT AND EXPERIENCE.

Soils, in respect of their needs, are not unlike sentient beings. The food wants of men and animals are never met with dietaries theoretically based on the composition of their bodies, or an analysis of the forces expended by them. The wants of animals in regard to quantity and quality of food vary greatly, and are met only by a due consideration of individual wants and tastes. In a large degree it is the same with soils. Their demands can be supplied only after actual trial has shown what those needs are. To arrive at an understanding, even approximately, of what soils will consume

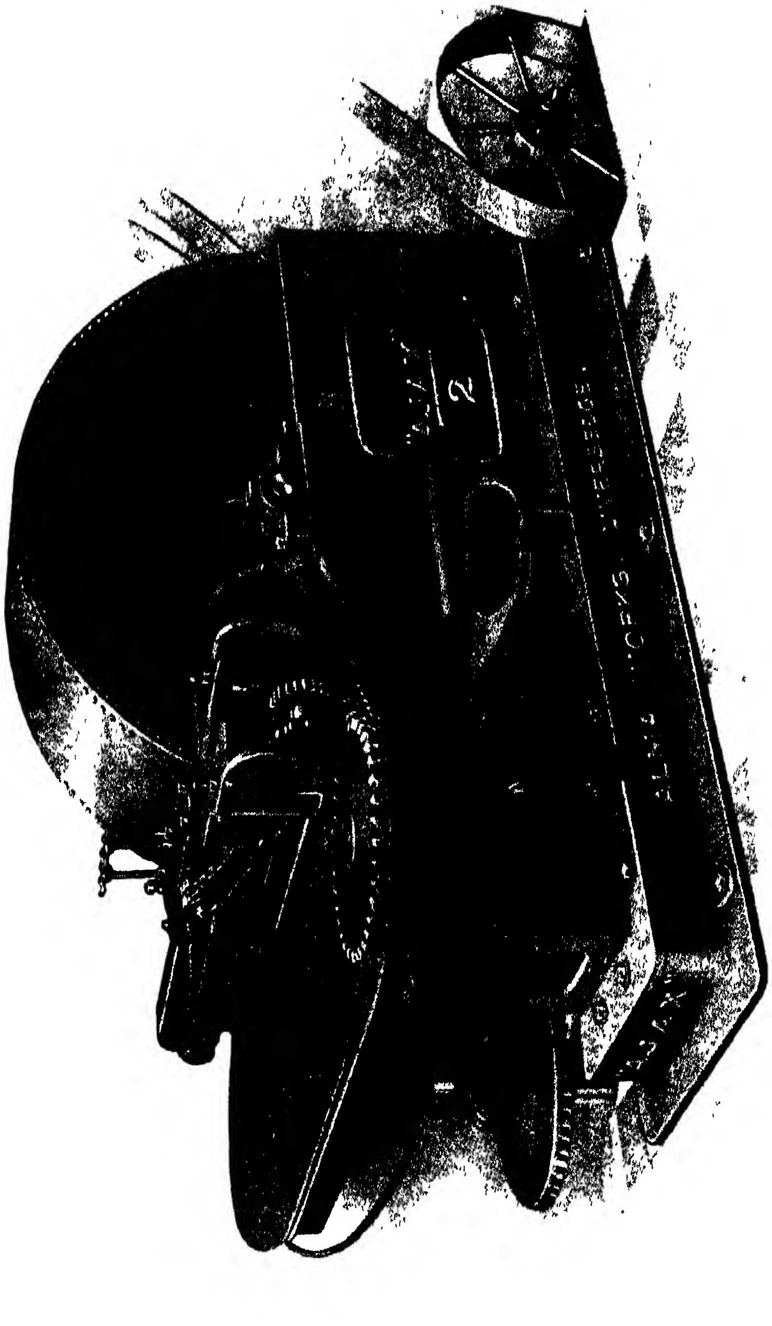
and pay for in increased crops is far from the easy task assumed by speculative writers who counsel farmers to "experiment," and thus ascertain the weakness of their lands. There is probably no class of agricultural experiments so uniformly disappointing to the experimenter, in the results obtained, as those made with commercial or concentrated fertilisers. In very many cases, perhaps in the majority, the variation of the crop has seemed to have a doubtful connection with the varying quantities and qualities of fertilisers used. Probably quite as great differences in the yield would have been shown had the experimental areas been treated precisely alike: or, again, if they had received no manure whatever. I by no means wish to be understood by this to assert that commercial or market manures are of doubtful utility in the canefield or elsewhere. I desire only to emphasise the fact that to restore the productive power of worn-out lands by the use of purchased fertilisers is an operation that requires sound judgment and accurate knowledge of soil and manures far beyond that ordinarily possessed by farmers. I go further, and assert that it is the business of the farmer, whatever his crops may be, to so manage his land that heroic restorative treatment is never required. If this be done, he will know from experience, with tolerable accuracy, the wants of his ground, and the practical means of supplying them. Good lands never become poor as the result of a single year's maltreatment, and lands once run down are not "restored" by a single application of manures or a single year of restorative treatment. The true and only successful way in which to bring run-down lands again into condition is to reverse the process by which their fertility was lost—that is, substitute good farming for the bad hitherto in vogue. To do this will require time, as well as the use of manure and sound methods of farming. All this leads back again to the point touched upon before—namely, that sound farming, not dosing of the land, is what is required to save it from running down or to restore it when once reduced.

(To be continued.)

MANILA HEMP MACHINES.

In the February number of this journal we drew attention to a paragraph in the "Philippine Agricultural Review" (Nov., 1909) giving some particulars of a new machine for extracting Manila fibre from the *Musa textilis* and from banana plants generally. Further, more detailed descriptions of the machine and its capabilities were promised in due course. So far none have come to hand, but we have met two gentlemen from the Philippines who have seen the Clarke machine at its trial. Neither was very much impressed with the work done. This may have arisen from the fact that at all trials of new patents, although a model may work to perfection, the machine built for actual work has to undergo many alterations before perfection is attained. Witness the numerous trials in Brisbane of the Daniels and the Jackson potato diggers. One ex-plantation manager from Mindanao said that the machine turns out 3 piculs (412½ lb.) of fibre a day, and that the price of the machine and engine is £1,200. Another informant stated that the very size of the machine, no matter what its capacity, reduces greatly its value to the hemp producers. The country whence the Manila hemp is to-day obtained is very rugged, and there are only mountain tracks, impassable for vehicles or even for horses, leading to the jungles where the Manila banana is found. It would be absolutely impossible to convey such a ponderous machine to the site of operations, and still more impossible to move it from place to place as is necessary, the plants growing in patches often some distance from each other. The "Mindanao Herald" (Historical and Industrial Number, Feb., 1909) gives several illustrations, showing the various operations connected with the

Plate VI.



THE "AJAX" SACK STITCHING MACHINE

hemp industry. In none of them is any machinery seen in use. The only apparatus shown is the old-fashioned bamboo spring and knife, which entail strenuous hand labour. The cost of this method of stripping is set down, in a published estimate of the capital needed to plant 2,500 acres of land in hemp, at 4·50 dollars (18s. 9d.) per picul (137½ lb.), and the profit per acre 116 dollars (£24 3s. 4d.). This profit is based on a regular selling price of 11·50 dollars (say 48s.) per picul (137½ lb.), or roughly £38 19s. per ton. The price of Manila hemp during 1909 ranged, according to Landauer and Co., "Review of the Hemp Market" for that year, from £19 10s. for "good seconds" to £27 for "fair current" per ton. In May, 1910, good seconds brought £22 15s., and "fair current" realised £24 10s. to £25 per ton—a difference, on an average, of £15 14s. per ton in 1909, and £10 1s. per ton in 1910. No doubt, with the advent of effective machinery, large profits could be realised, but until then hand labour must be relied upon.

There is certainly a machine—the McLane—for which it is claimed that it will do the work of twenty good strippers, which means that it will turn out 3 piculs (411 lb.) of fibre per day. The cost of the machine is put down at less than 1,500 pesos (£150). We shall be very pleased if really effective Manila hemp machines can be obtained, as we have in Queensland vast quantities of bananas, the stems of which are now allowed to rot on the ground, all containing a quantity of fibre, as has been proved by many experiments. The *Musa textilis* of the Philippines contains from 1 lb. to 1½ lb. fibre per 100 lb. of stem. The Queensland soils are well adapted to the growth of *Musa* or of any other kind of banana. All we require is a reliable machine of good capacity, and reasonable in price, to at once establish a new and profitable industry in this State.

DEFIBRATING MACHINERY.

Amongst the rather numerous machines for the preparation of sisal hemp which have been placed on the world's markets many are small machines demanding two manipulations of a leaf in order to produce marketable fibre. Other machines recommended by the inventors and manufacturers are worked by hand power. These latter are absolutely useless for the fibre planters. They are hard to work, a proper speed cannot be imparted to the scutching drum, and only a very small quantity of fibre can be produced in a day of ten hours. There is, for instance, one of these hand machines now on sale in Brisbane, which costs £5. This machine, according to the reports on its work, requires five persons to work it, and it produces, it is said, between 60 and 70 lb. of fibre per day of ten hours. Seeing that the value of this amount of sisal fibre is worth from 13s. to 15s., it will be seen that such a machine would only result in a dead loss to a Queensland planter, although it might and probably does pay to work in a country like Java, where the wages of three men, one woman, and a boy only come to 3·75 francs (3s. 1½d.) per day, as against 35s. a day besides board for an equal amount of labour in Queensland working eight hours a day. With the small power-driven Raspadors, only six to eight leaves a minute can be passed through such machines, and only half the leaf can be cleaned, when it must be withdrawn and the other half put through. None of these machines will pay to work in Queensland.

On the other hand, there are splendid machines in which the leaves are automatically cleaned, and which are capable of cleaning from 40,000 to 150,000 sisal leaves per day of ten hours by the labour of six men, besides the cutters and carters. Such machines are the Prieto, the Todd, the Finigan-Zabriski, the British-made "Ajax." The great cost of these fine machines precludes their use at present on the small Queensland plantations, although a Finigan-Zabriski machine is doing good work on a plantation of 60 acres at Childers, turning out over 1 ton of marketable fibre daily. Since many

larger plantations have been opened up in Central and Northern Queensland, however, it is only a question of time when the best machines will be needed. The cost of them runs to £600, to which freight and other expenses have to be added. Engine power to drive these machines is also very costly. The power needed ranges from 15 to 70 h.p. The Prieto Company have now placed on the market a lower-priced but effective automatic machine, the "Irene" No. 51, requiring 12 h.p., and which will clean 20,000 to 30,000 leaves per day. The cost of this machine is only £300 f.o.b. London. Such a machine, of which it is said that large numbers are in use, cannot fail to commend itself to planters of from 60 to 200 acres of sisal, Fourcroya, or Sansevieria.

Of the British-made machines, the automatic "Ajax" defibrator has been named to us as a perfect, low-priced machine. It is manufactured by the Alma Machine Works, Liversedge, Yorkshire. This is an automatic single-drum machine of moderate capacity, for, say, 2,500 to 3,000 leaves per hour, requiring not over 15 b.h.p. Like the "Irene," it is adapted for plantations up to 200 acres, and has a productive capacity of from ½ to 1 ton of fibre per day, according to the character of the leaves treated. This machine only weighs 2½ tons net. The selling agents are Messrs. Walter Griffith and Co., 6 Crosby Square, London.

The extension of the sisal industry in Queensland for the present depends on the possibility of obtaining fairly cheap and effective automatic decorticating machines. Machines which require a large amount of hand labour are useless here, and as at least three years must elapse before the existing plantations will be ready to produce fibre, and then probably on areas of from 60 to 100 acres, it is absolutely necessary that a machine costing about £250 to £300, capable of being worked by at most four men, should be obtainable by planters. In the course of the next ten years there will certainly be a demand for larger machines, when the plantations have been extended to from 300 to 500 acres.

NOTES ON RUBBER IN TROPICAL AUSTRALIA.

By HOWARD NEWPORT, F.R.H.S., Instructor in Tropical Agriculture and Director of the Kamerunga State Nursery.

In July last a correspondent, writing to a Brisbane newspaper, made the astonishing statement that rubber would not thrive in North Queensland, and practically advised people to have nothing to do with it. The writer of this absurd statement cannot have travelled very far north of Brisbane, or he would have been compelled to make an absolutely contrary report. To show how wrong he is in his conclusions (from apparently no premises), we reprint a paper published in this journal in June, 1908, written by Mr. H. Newport, who, of all men, is not one to encourage an industry if he sees failure looming ahead. Mr. Newport wrote:—

To those concerned in the extension of rubber cultivation in Queensland recently, the following figures may be of interest. Of the plants imported by Mr. F. P. Logan, in January, 1907, 4,040 were finally distributed; of the Department's special importation in January, 1908, including plants raised from seed obtained at the same time, 7,434 plants resulted; plants raised from seed at the Kamerunga State Nursery, including seed distributed (allowing for a 52 per cent. germination only), 4,726 plants. This gives a total of 16,200 plants distributed up to the end of April, 1907, equal to an area of 81 acres if planted 14 by 14 feet (or 200 to the acre), and if all were planted in definite areas, which, of course, they are not, many having planted but a few trees in their gardens, and along roadsides, &c., in their farms.

The foregoing figures refer only to Pará Rubber *(Hevea Braziliensis)*. Of other rubbers, mostly Assam or Rambong *(Ficus elastica)*; Central American *(Castilloa elastica)*; Ceara *(Manihot glaziovii)*; and African *(Funtumia*

elastica), enough plants have been distributed to plant about 7 acres, as well as some 11,000 seed.

Of the Department's first importation in January of this year, the seed imported resulted in a germination of about 37 per cent., and the plants suffered a mortality *en route* of about 20 per cent. This was, however, mainly due to the consignment having been unfortunately carried on to Brisbane and returned to Cairns, involving an extra fortnight at sea, instead of having been landed in the North. Of the plants thus imported, some 2,500 are still in hand, but have all (and more) been bespoken, and are awaiting despatch.

The Department is making another importation of some 10,000 seed or plants, and it would be as well for intending growers to bespeak these as soon as possible to ensure getting the number they want.

The Pará rubber plants put out in banana plantations that are still being worked, and in which the rubber can benefit by the clean weeding and partial shade, are doing remarkably well in the vicinity of the Tully River, near Cardwell, and Johnstone River, at Geraldton. Many of these plants, barely 18 inches high, and as thick as fencing wire when planted, now (1908) show 7 feet in height and a circumference of 3 inches at the ground for the year's growth.

Having been planted among the bananas, they participated in the cultivation, and thus the cost of upkeep has been practically nil. By the time the bananas are, according to the Chinese ideas, worked out, the rubber should be big enough to tap.

Regarding the value of land so planted, it will be interesting to note that the "Times of Ceylon" suggests that £100 per acre would be a moderate price for six-year-old rubber.

If only all the land that has been under bananas and subsequently abandoned, or even the land now being cultivated with bananas, were so planted, and became, with little or no cost, five or six year old rubber plantations when no longer required for bananas, what an asset to the State, not to mention the landowner, and what a contrast to the present methods whereby such abandoned areas grow only noxious weed!

* The price of rubber has dropped considerably since this time last year, and good plantation Pará now fetches between 3s. and 4s. per lb. It is, however, expected to rise somewhat, though not to the figures of last year. Despite this, however, the opinion of those most interested, as shown in the following extracts from the "India Rubber World" for March, will be of interest:—

"Mr. James Wilson, of England, chairman of the Ceylon Land and Produce Company, on seven of whose plantations 5,695 acres have been planted to rubber, after a recent visit to Ceylon, expressed the opinion that rubber planting will pay for many years to come. He thinks that the price ought to rise a bit when the money market resumes its normal condition, but not to the high prices of a year ago.

"A planter from Ceylon, who visited England lately, reports an interview he had with one of the directors of the India Rubber, Gutta Percha, and Telegraph Works Company, at Silvertown, who expressed the opinion that rubber planting would be a good investment for the next twenty years at least. The rubber manufacturer felt that if rubber remains as cheap as now, a marked increase in its use would result."

Rubber is being extensively planted in the tropical countries all round us. In Sumatra alone, a correspondent of the "Ceylon Observer" states that 2,000,000 trees, representing 14,000 acres, have been planted. He adds that three rubber trees on an old coffee plantation are reputed to have yielded over 5 kilograms (11 lb.) each in one year.

* Two years have elapsed since rubber was bringing 3s. per lb. To-day the price has reached 13s. per lb., and sales have been made two years ahead at 11s. per lb. When the 16,000 to 20,000 rubber trees mentioned as having been planted in North Queensland arrive at the tapping stage, and many have already reached that point, it will be seen that a man cannot do better than add a few hundred rubber trees to his ordinary farm crops, be they banana, sugar, coffee, or cotton.

Even at a profit of 1s. per lb., and a production of 1 lb. per tree, the return per acre of 200 trees is good; at 3 lb. per tree it will compare favourably with any agricultural product whatever in the country; and, with a possibility of such returns as above quoted, or even a portion of it, the returns, to say the least, are attractive enough for the most sanguine.

Rubber companies are quoting 15 to 30 per cent. dividends per annum in Ceylon, the Straits Settlements, Java, Sumatra, &c., and will shortly be doing so in the Solomon Islands and Papua. Why not in North Queensland?

One more quotation, *re* synthetic rubber, from the "India Rubber World" is to the point:—

"While a great deal has been printed in England and the British colonies during the past year on the subject of 'artificial' or 'synthetic' rubber, and the possibility of some such material competing with natural rubber, it does not appear that any real progress has been made in the new field. In other words, the rumours referred to have served only to scare some investors in rubber-planting companies. The sentiment of the British crude rubber trade, after a year of such rumour-mongering, is well expressed in this paragraph from the review of the trade for 1907, issued by Lewis and Peat, London rubber brokers:—'During the past year artificial rubber has been talked about a great deal, but, so far, nothing tangible has been forthcoming, and we do not know anyone in the rubber trade of any importance or authority who believes in the likelihood of the production of a substitute for the real article, or has seen a sample of it, and at the lower range of prices for all kinds of rubber and the increasing supplies the danger now from this source is more remote than ever.'"

Since the above was written, several more thousands of rubber plants have been distributed from the Kamerunga State Nursery, and it will be found that by combining rubber with banana, cotton, and sugar growing, a rubber plantation can be established very cheaply indeed. This we showed in an article in the April issue of this journal, and that article has been endorsed by several Northern men and ex-sugar planters.

CATCH CROPS FOR RUBBER.

Many persons would be induced to go into rubber-planting on the rich lands bordering the rivers of Tropical Queensland were it not for the length of time which must elapse between planting and tapping—from five to six years—during which time the plantation must be kept clean. Meanwhile, however, it is quite possible and practicable to grow some subsidiary crop which will enable the planter to clear expenses, and perhaps more, until the profitable rubber harvest begins. There are various crops which can be planted between the rubber trees, without the least detriment to the latter, provided the trees are planted at proper intervals. Amongst these are cotton, chicory (worth to-day £25 per ton in Melbourne), sweet potatoes, &c. These help to keep down the weeds and save much labour and expense.

The "India Rubber Journal" contains an article on the catch crops that are employed in cultivations of Pará rubber in Malaya. After explaining that many planters were at first discouraged in the matter of starting rubber plantations, on account of the fact that so long a time elapses before the plant becomes remunerative, it shows how some attempted to ameliorate this condition by the employment of catch crops.

One of the first of these to be used was coffee; in fact, the pioneers of rubber-planting in Malaya were coffee-planters whose rubber trees were, in many cases, grown among coffee plants. Cassava was shown by the Director of the Singapore Botanic Gardens to be a suitable crop for the purpose, chiefly on account of the additional tillage of the land that its cultivation induced.

Sugar-cane has proved to be valuable in this connection; an instance is given in the case of an estate in Perak, where 2,000 acres of rubber has been cultivated among canes as a catch crop, partly during two and partly during three years, while the revenue from the sugar has more than covered the expenditure on the estate. Bananas have proved valuable, whether the fruit was exploited or not, for in the latter case the cultivation is useful in keeping down weeds, and on light land the texture of the soil was improved. Indigo has also been employed with success as a catch crop.

It is stated that, in order that the full benefit may be derived from catch crops among rubber, the rows of trees should be about 30 ft. apart, and that there should be a space of 3 ft. on each side of the stems in the row, where nothing should be allowed to grow.

THE DANGER OF OLD TREE STUMPS.

Rubber growers who merely clear the scrub on their plantations, leaving the stumps standing, and many big logs lying about, will do well to consider the danger to their trees, pointed out in the following article by the editor of "Tropical Life":—

As the land in the Tropics being planted up rapidly increases, so do the complaints of root and other diseases among the crops. We feel, therefore, in spite of our repeated warnings about the trouble and expense that planters render themselves liable to, if they do not remove the tree stumps and roots, that this most necessary work is being neglected to a greater extent than is often necessary, especially among seedlings and young trees. The Council of the Trinidad (W.I.) Agricultural Society also found it necessary to call attention to the matter by publishing the following notice in their monthly bulletin:—

"Considerable areas of forest land in the colony are being taken up and cleared for the cultivation of such crops as rubber, cacao, and limes; it is desirable, therefore, to warn cultivators that the logs and the stumps of trees that have been felled may constitute a danger to the cultivation, and that certain precautions should be taken.

"It has repeatedly been noticed that plants which are growing in very close proximity to a fallen log or old stump may sooner or later die. This has been held to be due to "poisonous juices" from the rottting of the log or stump, and on account of this a large number of planters will rarely put in a young plant near to either a log or a stump.

"As the stumps or logs commence to rot, it has been observed that fungi are invariably present, and instead of the "poisonous juices" causing the death of the seedlings, it is the fungi spreading from these rottting logs to the roots of the plants that destroy them. On several occasions fungi threads have been traced directly from a rotten stump to the roots of the young lime plants, and it is concluded that the fungus, on account of increased growth in so suitable a medium as a rotting log, may have become sufficiently vigorous to kill out those growing plants that are in the immediate neighbourhood.

"A large number of plants in the West India Islands have been lost in this manner, and in the report of the Government Mycologist for the Federated Malay States for 1907 it is stated that the greater number of inquiries from planters in respect to diseases of rubber referred to the root disease caused by a fungus that had spread from some of the numerous old jungle stumps among the rubber trees to the healthy young plants of from fifteen to thirty months old. It is further reported that fungal threads have, on different occasions, been traced from an old stump in the nursery to young plants immediately around it.

"The removal of stumps from large areas of newly opened land is of course impracticable, and, therefore, planters must be prepared for some cases of these root diseases. In planting out, however, it is preferable that young plants should be set out of the "line" rather than they be planted too close to either stumps or logs. Further, any plants that subsequently show signs of root disease should at once be isolated by digging trenches around them at least 18 in. deep, and those that die should always be removed and burned, or otherwise they will become sources of infection.

"On no account, however, should stumps be allowed to remain in any land that is to be used for the purpose of a nursery. They should always be carefully removed, for when planting is being done the young plants that might become affected would, in most probability, be distributed throughout the whole plantation. Those diseased plants would not alone die out, but would form centres of infection, and therefore be a danger to the entire cultivation.

"In cacao cultivation in the West India Islands it has been noticed that root disease frequently commences from bread-fruit, bread-nut, or avocado pear trees that have been planted in the cacao, and it is therefore advised that in new plantations these trees should not be planted, and that when any such trees have to be removed from old plantations care should be taken to extract their roots."

COCOANUT PALM DISEASE.

We ("Agricultural Bulletin of the Straits and Federated Malay States") have lately received from a correspondent, in Borneo, an account of a serious disease in cocoanuts which bears so great a resemblance to that known as bud-rot, which has hitherto only been met with in India and Ceylon, at least in this part of the world, that it seems highly probable that it is identical. Our correspondent, Mr. E. Hose, describes it as follows:—"The leaves turn yellow and the fruit, if there is any, hangs limp, the leaves drop down and gradually die, the stem of the tree gets thinner and thinner near the top, then the centre shoot drops out, apparently having rotted; inside the heart, at the top, it is like rotten wood-mud. It seems to attack trees of any age. Trees on wet or dry land are affected by it. According to native stories, it has only put in an appearance since the last two years." A very valuable and full account of an exactly similar disease is published in the Bulletin of the Agricultural Research Institute of Pusa, No. 9, March, 1908, by Mr. E. T. Butler, the Imperial Mycologist. He says: "As a general rule, the first indication that a cocoanut palm is attacked is the opening out of the outer leaves from the head. The leaf stalk becomes slightly flaccid and the weight of the leaf causes the whole to drop. Then the ends of the pinnae or leaflets at the extremity of the leaf become flaccid and hang down almost vertically; this is accompanied with a loss of colour; the drooping and discolouration of the leaflets then extend gradually backwards to the whole leaf. Later on, the tips of the leaflets turn yellow and dry up, followed gradually by the entire leaf, which eventually hangs down, withered, from the crown. The attachment of the leaf-sheath to the tree is weakened so that the outer discoloured leaves can be easily torn from the crown one after another, or many together; all the leaves are similarly affected. . . . . Gradually, as the palm weakens, new leaves that are put out are smaller than of old. This is apparent even before they unfold from the bud, and results in the central shoot, which is merely the unopened leafbud, becoming stunted and pallid. Later on, it begins to wither and the upper free part turns brown. Eventually it may dry up altogether, but this may not occur for many years. The top of the stem and the white internal part of the crown are quite normal, except in old cases just before death, when the latter rots

One of the conspicuous marks is the way the nuts are injured. Even in the first year or two the nuts are affected. They are fewer and smaller than usual; on splitting the husk is found unaltered and usually the shell also. The white kernel is, however, shrivelled and indurated, and copra prepared from it is said to be deficient in oil. The fluid inside is reduced in quantity, and is altered in quality, becoming unpalatable to drink. In later stages a large proportion of the nuts drop in an immature condition. In more severe cases the spathes are unable to burst out at all, or, if they do, rot away early and the palm becomes barren."

This description fits well the account from Borneo, and seems certainly to be of the same disease, and as it has thus approached so near to the Malay Peninsula it is very desirable that a watch be kept for its appearance here.

The disease is not situated in the bud of the tree, but in the roots, which are attacked by a parasitic fungus belonging to the genus *Botryodiplodia;* at least this fungus appears always to occur on the rotting roots of trees affected by this disease. The destruction of the lateral roots cuts off the water supply of the palm so that the bud dies of drought and starvation.

The death of the palms is very slow. Young palms may be killed in five years, but this is exceptional. Eight or ten years appears to be a more usual period, while in many cases the disease progresses enough to cause barrenness but fails to kill the tree outright. Thus, in one large garden only 200 cocoanut palms were in bearing out of about 2,000, while the deaths were not numerous.

The disease is worst in heavy alluvial valleys and poor laterite hill soils. It is least severe in the sandy soil of the littoral. There is plenty of evidence that the disease is infectious. A palm evidently affected and brought from an infected district ten years ago was planted in a garden where the trees were all healthy. A few years later it began to turn yellow, and others near by were attacked; now thirteen trees are affected and the original one is dead, and the disease has spread to neighbouring gardens.

The disease attacks not only cocoanuts, but betelnuts, and caryotas. The treatment recommended is destruction of all diseased palms whether they be only just attacked or practically dying. The roots should be dug out and with the stem leaves burnt at once. Lime, preferably quick lime, should be well dug in to the infected spot, and the ground frequently dug over to break up and aerate the soil. If necessary, the soil should be drained (as undrained or insufficiently drained soil affects the roots injuriously), and the weeds on the ground destroyed, and manuring with cow dung or nitrogenous fertilisers should be tried. No plants should be planted in the infected spot for a year after the removal of the diseased trees.

As in the case of most at least of these underground root fungi, the progress is comparatively slow, so that it should be possible if taken in time to stop an outbreak with the loss of a very few trees; but in order to do this plantations must be carefully examined, and any tree exhibiting the symptoms described above should be destroyed and removed as quickly as possible.

There is another bud-rot disease in India produced by the fungus *Pythium palmivorum* in which the shoot is actually attacked by the fungus. The withering of the shoot at an early stage is the most characteristic feature. The first symptom is the turning white of a whole leaf towards the centre of the crown, the bud then turns white, rots, and the crown falls off, the whole of the "cabbage" becoming converted into a putrid, foul-smelling mass. The whole palm is killed in a few months, and recovery is very rare. But these symptoms do not seem to be identical with those of the Borneo disease. It appears chiefly to attack the palmyra palm in India but also areca and cocoanut.

Vegetable Pathology.

THE PUMPKIN BEETLE.

REMEDIES: PUMPKIN BEETLE (*Aulacophora hilaris*, Boisd.).

BY HENRY TRYON, Government Entomologist and Vegetable Pathologist.

PRELIMINARY CONSIDERATIONS.

In entering upon procedures for coping with the pumpkin beetle (*Aulacophora hilaris*, Boisduval) the following facts must be taken into consideration:—

1. There are several broods during the summer months, and, as with each successive one there is a large increase in numbers, it is expedient to attack the progenitors of the destructive hosts by resorting to measures early in the season when as yet but few beetles are noticeable. By no means should operations be delayed until they are already proving very harmful.

2. The insect passes its egg—larva or grub—and pupa or chrysalis conditions in the soil. Of these the larval one is spent by the insect in the root or base of the stem of its food plant (pumpkin, &c.), and probably also in corresponding parts of other plants. Hence clean cultivation is especially called for. The crop should be taken off as soon as ready for harvesting, and thenceforth all plant refuse, including the vines of pumpkins, marrows, cucumbers, &c., especially, disposed of by being burnt or removed. Again, when living under these conditions, the insects are practically undiscernible by man. However, their friends, the birds, readily discover their presence, and will assail them. It, therefore, behoves the farmer who experiences the ills due to the pumpkin beetle to protect these. Since the general use of the pea-rifle in our farming areas this insect has increased in numbers year by year, and, therefore, banishing this implement from our agricultural holdings will aid in the reduction of the injurious insect under consideration as well as in that of others.

3. From the foregoing it may be inferred—as is the case—that the pumpkin beetle attacks not only the plant to which it owes its trivial name, but is also similarly partial to cucumbers, melons, vegetable marrows, and other cucurbitaceous plants. Accordingly, measures of repression must be extended to all of these. Less frequently it feeds on the produce of some of our deciduous fruit trees—a habit evinced in 1909-10.

4. As the plants attacked are rapid and vigorous growers, insecticides, wherever employed, must be administered from time to time, whenever new growth has not received any application of them. Again, to secure their full efficiency they must be administered thoroughly, and then by aid of suitable appliances (*e.g.*, knapsack spray pump).

REMEDIES.

1. If at the commencement of the season the insects are few—"none to speak of," as may be remarked—endeavour to deal with them by hand-picking. This is practicable in early morning, for then the insect will not readily take wing. A small premium paid to children will often accomplish much in this direction.

2. When the plants are quite small, and when, therefore, a few insects can accomplish much injury, secure them from injury by some covering—*e.g.*, hessian or scrim fastened over two bent sticks crossing at their centres (properly constructed frames of this nature, if not left out in the field after they have served their purpose, will last long, and so may be used again and again).

3. Young plants where the conditions of growth do not admit of No. 2, and ones also of older growth that are beyond the use of the "frame covering," should receive an application of some substance that will deter the

insects' visitation to them. In the absence of evidence yielded by experiment, any one of the following substances may be tried:—

(*a*) The refuse of acetylene gas manufacture.
(*b*) Ammoniacal gas water.
(*c*) Plaster or lime impregnated with turpentine, kerosene, or phenyl.
(*d*) Tobacco dust.
(*e*) Vaporite Strawson, apterite, or other such substance, containing napthalene.

These in each case to be sprinkled on the ground around the growing plant, but away from the stem, and only in such amount as to bestow a marked odour upon it.

4. Having already planted the pumpkins closer in rows than usual, sprinkle well a majority of the plants with well-sifted dry wood ashes or with ordinary road dust, and leave one here and there free from such application. These latter will serve as trap-plants (it is usually found that the beetle avoids the soiled in favour of the clean ones) for the insects, and these having habitually resorted to them may be killed by insecticides (No. 5), and, if desired, removed. Flowers of sulphur and lime (1 part in 3) may be substituted for the wood ashes, and applied as in the ordinary manner of "sulphuring" grape-vines for mildew—*i.e.*, with a sulphuring bellows. (*Note.*—This sulphur and lime application will greatly assist at the same time in subduing the powdery mildew of the pumpkin plant—a very harmful parasite.) Again, vegetable marrows may be used for the trap-plants. Their quick growth and abundant foliage render them especially attractive when planted amongst pumpkins. The method of trap-plants may be varied. Thus those intended for this purpose may be set earlier, and alternate in the rows or in the lines.

5. Poison the plants by spraying them from time to time with arsenate of lead (1 lb.) or with Blundell's Paris green (¼ lb. and lime ½ lb.) in every 50 gallons of water, or—as a substitute for either—with Bordeaux mixture (1 lb. copper sulphate, 6 lb. of lime, and 50 gallons of water) mixed with arsenate of lead (1 lb.) or arsenite of lime (Kedzie formula).

It may be added, in conclusion, that this insect is not only a very destructive one, but one, on account of its habits, very difficult to cope with; and that success in this direction can only be achieved by thorough treatment according to the lines laid down, or by action that recognises the principles underlying them.

SYNTHETIC RUBBER.

The chairman of the Bayer Synthetic Rubber Company, speaking at a meeting of shareholders held at Elberfeld, Germany, last month, stated that the company had succeeded in producing synthetic rubber last autumn, and were, he believed, the first to do so. It must not be forgotten, however, he added, that there was a wide gap between solving the purely scientific problems connected with a matter of this description and overcoming the technical and commercial difficulties connected with production on a large scale. In the case of indigo, for example, although this was synthesised twenty-seven years ago, a further fifteen years elapsed before the technical manufacture was possible. It was impossible, therefore, to say how long it would be before the company could be in a position to produce rubber commercially—it might take as long as had been the case with indigo, or it might be done more quickly. With rubber, the difficulties were greater than with indigo, where the annual value of the crop was only about £3,000,000. In the case of rubber, taking the world's annual consumption at 70,000 tons, the value would much exceed £50,000,000. The present price was exceptionally high—a few years ago it was only one-fourth as much—and rubber could be grown at a cost of less than 2s. per lb. It would be seen, therefore, that to compete with natural rubber was a much more serious undertaking than was the early competition against natural indigo.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

Table Showing the Total Rainfall for each Month of the Year in the Agricultural Districts of Queensland.

Stations.	1909.							1910.					
	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.
North.													
Bowen	1·98	1·23	0·13	0·21	0·36	3·15	19·98	15·45	7·10	21·45	5·26	0·18	2·23
Cairns	2·48	0·65	2·48	0·7	3·19	7·31	15·24	21·80	17·12	24·16	16·18	3 51	6·59
Geraldton	9·13	6·53	5·32	0·36	6 71	14·57	19·98	20·35	34·57	33·74	24·57	11·80	19·35
Gindie State Farm ...	...	...	...	...		..	...	...	...	.	..	. .	2·65
Herberton	1·22	0·20	0·75	0·50	2·30	4·50	5·11	16·64	12·21	12·40	3·50	1·85	1·70
Hughenden	1·71	1·37	0·33	0·8	1·95	0·54	8·01	4·52	3·59	2·95	0 30	0·41	0·85
Kamerunga State Nurs.	...	...	...	...	...	..	...	...	..	...	...	..	Nil
Mackay	2·05	4·00	0·75	0·73	2·88	3·18	25·56	35·28	9 73	24·31	6·18	3·73	5·70
Rockhampton	1·33	2·99	1·37	1·20	2·16	4·55	2·74	11·93	1·28	19·84	0·61	0·59	5·98
Townsville	1·51	0·83	0·57	0·12	2·07	1·31	11·51	23·07	10·85	17·21	2·29	0·26	1·05
South.													
Biggenden State Farm	2·60	4·01	1·78	0·29	...	2·83	6·96	7·22	3·99	3·82	0·73	1·06	5·25
Brisbane	1·75	2·10	2·44	2·74	1·56	4·14	6·45	7·24	4·19	6·42	1·22	0·43	6·74
Bundaberg	1·51	5·65	1·66	0·98	0·42	3·55	2·99	11·81	2·43	8·92	0·31	0 19	6·17
Dalby	1·87	1·19	3·13	0·47	1·92	2·13	2·45	10·88	1·33	3·87	Nil	Nil	6·06
Esk	2·43	2·74	3·31	2·60	2 61	2·69	9 20	8·60	1·94	6·09	1·19	0·27	4·74
Gatton Agric. College	1·22	2·02	2·09	2·29	1 87		3·92	11 79	..	3·66	0·69	0·61	5·05
Gympie	2·96	4·70	2·80	1·70	2·30	3·82	16 34	5·92	3·48	7·74	1 13	0·22	5·57
Ipswich	1·31	1·67	1·34	3·55	1·93	1·56	4·72	6·91	2·78	3·56	1·65	0·20	3·74
Maryborough	2·57	5·02	2·53	1·56	0·51	3.94	6·83	5·65	2·99	3·92	1 72	0·64	4·89
Roma	2·73	1·54	4·83	0·12	0·90	2·12	1·05	4·74	1·47	8·36	0·15	0·4	5·71
Roma State Farm ...	..	...	...	...	.	...	. .	..	...	..	..	.	
Tewantin	3·24	4·08	4·24	1·38	3·82	1·90	8·85	5·96	3·42	15·18	6·30	1·31	15·08
Warren State Farm .	...	...	...	..	. .	. .	..	.	...	. .		.	1·88
Warwick	1·23	2·04	2·28	1·77	2·85	2·77	4·25	3·93	3·14	2·57	0·68	0 55	3·16
Wellington Point ...	...	...	...	...	. .	..	9·00	...	...	...	...		..
Westbrook State Farm	...	...	..	...	...	...	...	...	...	.	.		2 77
Yandina	2·70	3·70	5·81	3·84	2·30	0·76	20·18	6 71	2 07	11·81	3·26	0·40	13·13

Note.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND, Divisional Officer.

COMMONWEALTH BUREAU OF METEOROLOGY.

Divisional Office,
Brisbane, 30th June, 1910.

Notes on the distribution of rainfall in Queensland during June, 1910:—

The passage of a very remarkable and unseasonable tropical disturbance along the Queensland coast during the first three days of the month was attended by precipitation of a general nature over all that part of the State lying east from a line joining Townsville and the south-western corner. The coastal tract, of course, received the heaviest falls, notably the seaboard between Sandy Cape and Tweed Heads, 10·56 in. having been registered at Tewantin and 10·20 in. at Cleveland during the twenty-four hours ending 9 a.m., 2nd, to mention only two of the most remarkable amounts; but the Central districts and the interior of the Southern division as far westwards as the meridian of Charleville participated to a satisfactory degree, especially the wheat country, to which the downpour came at a most critical time. After the storm system passed away, a long spell of fine, dry weather ensued which lasted until the middle of the period, save only a few unimportant

showers along the seaboard, but the remaining portion was abnormally unsettled and wet throughout the State, with the exception of the Gulf and Peninsula regions, which received little or no rain all through the month. The operating causes were somewhat obscure and indefinite monsoonal disturbances—the first producing general rain in the Western and South-western districts, much of it of a very beneficial nature, though in the main somewhat capricious as to quantity; the second affecting practically the whole of the Central and Southern divisions, extending also to the mid-interior of the Northern division. From the 26th to the end of the month no rain fell north from the Tropic, but showery conditions were prevalent along the subtropical coast, extending inland to the eastern parts of the Darling Downs.

The heavy rain which accompanied the passage of the tropical cyclone raised the monthly totals far above the average in the sub-tropical coastal districts, the excess in the metropolitan area (as represented by the Brisbane Observatory record) having been as much as 3·46 in.

Particulars of the aggregate falls at the principal stations in Queensland are given in the accompanying table.

PASTORAL INDUSTRY OF AUSTRALASIA.

ANNUAL WOOL REPORT.

A comprehensive review of the Australasian wool trade for the past season has been issued by Dalgety and Co., Limited, and, as customary, the report is an exceedingly interesting one, filled with readable information and many useful tables dealing with wool production, exports, and sheep statistics. The Annual Review is in its twelfth year of issue, and the company publishing it is to be congratulated upon the complete manner in which the subject has been treated. It is pointed out by them that the statistical year just closed has been the most generally satisfactory one in the history of Australia, while results achieved in New Zealand have been above the high average previously established in the Dominion.

The flocks in Australia and New Zealand have increased during the year by 6,179,614 head, the total being now 115,525,581 head, a higher number than at any period during the past sixteen years, and approaching the record of the year 1891, when the figures reached 124,991,920. Not only have numbers increased, but the sheep continue to improve, as is shown by the fact that though there were more sheep to shear sixteen to twenty years ago, the past clip has easily eclipsed all previous records. The actual oversea shipments of wool during the twelve months have amounted to 1,921,705 bales from Australia, and 512,938 bales from New Zealand, a total of no less than 2,434,643 bales, or 816,861,665 lb., valued at £33,128,496, an increase of 146,539 bales, or 60,271,502 lb., and in money value of £7,177,584, as compared with the record clip of the previous (1908-9) season. This result is all the more striking when it is realised that the two million bales limit was reached for the first time in the year 1906-7, and that the past year's figures are nearly double those of the year 1903-4. There could be no better proof of the marvellous recuperative powers of this country, from which the exports of other products have increased in almost like manner.

Attention was drawn by Dalgety and Co. at this time last year to the fact that the evil effects of the American crisis were fast disappearing, the demand for wool was improving in almost every quarter of the world, and in most trades the prosperity temporarily lost in 1907-8 seemed to have been won back. Under the circumstances, an optimistic view as regards prospects was justified, especially with respect to wool values, for it was shown that our staple product enjoyed an almost unique position, in relation to other commodities, statistically. No one anticipated, however, that wool would

on the average realise over 20 per cent. more than during the preceding year, yet that has been the net result ; and the largest clip on record has been taken for genuine consumption without a hitch, at almost constantly advancing values.

It is most gratifying to know that prospects for another bounteous season in Australasia are encouraging. The magnificent and general rain which fell in March gave the subsoil a thorough soaking, but it was not followed up by any further fall for nearly two months, in consequence of which the surface of the ground became very dry and hard, and for a time the outlook was discomforting ; but, thanks to the splendid downfall experienced almost everywhere during the past month, the outlook has been completely changed. There has been a marked absence of frost so far, grass and crops are responding to the supply of moisture, and as the lambing should be well up to the average, and as fewer deaths of grown sheep than usual are reported, the net increase in sheep numbers should be considerable.

The wool clip is sure to show some further increase in volume, and will, no doubt, be marketed in the selling centres of Australasia, which seem to gain in popularity each year, and provided values rule up to, or even moderately close to, rates now current, wool-growers will again reap a good reward for their labours, which continue to do so much towards the general prosperity of these lands.

The sales effected by Dalgety and Company in Australasia total 368,000 bales, entitling the company to the distinction of being the leading woolselling house in Australasia.

Times of Sunrise and Sunset at Brisbane, 1910.

Date.	May.		June.		July.		August.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·17	6·30	5·0	6·39	5·3	6·30	5·18
2	6·14	5·16	6·30	5·0	6·39	5·4	6 30	5·18
3	6·14	5·15	6·31	5·0	6·39	5·4	6·29	5·19
4	6 15	5·14	6·31	5·0	6·39	5·4	6·28	5·19
5	6 15	5·13	6·32	5·0	6·39	5·5	6·28	5·20
6	6·16	5·13	6·32	5·0	6·39	5·5	6·27	5·21
7	6·16	5·12	6·33	5·0	6·39	5·6	6·26	5·21
8	6 17	5·11	6·33	5·0	6·39	5 6	6·26	5·22
9	3·17	5·11	6·34	5·0	6·39	5·6	6·25	5·22
10	6·18	5·10	6·34	4·59	6·39	5·7	6·24	5·28
11	6·19	5·9	6·34	4·59	6·39	3·7	6·23	5·23
12	6·19	5 9	6·35	4·59	6·39	5·8	6·22	5·24
13	6 20	5·8	6 35	4·59	6·38	5·8	6·22	5·24
14	6 20	5·8	6 36	4·59	6·38	5·9	6·21	5·25
15	6 21	5·7	6·36	4·59	6·38	5·9	6·20	5·25
16	6 21	5·6	6·36	5·0	6·38	5·10	6·19	5·26
17	6 22	5·6	6·37	5·0	6·37	5·10	6·18	5·26
18	6·23	5·5	6 37	5·0	6·37	5·11	6 17	5·27
19	6·23	5·5	6·37	5·0	6·37	5·11	6·16	5·27
20	6·24	5·4	6·37	5·0.	6·36	5·12	6·15	5·28
21	6·24	5·4	6·38	5·0	6·36	5·12	6·14	5·28
22	6·25	5·3	6·38	5·1	6·36	5·13	6·14	5·29
23	6·25	5·3	6·38	5·1	6·35	5·13	6·13	5·29
24	6·26	5·3	6·38	5·1	6·35	5·14	6·12	5·30
25	6·26	5·2	6·39	5·1	6·34	5·14	6·11	5·30
26	6·27	5·2	6·39	5·2	6·34	5·15	6 10	5·31
27	6·27	5·2	6·39	5·2	6·33	5·15	6·9	5·31
28	6·28	5·1	6·39	5·2	6·33	5·16	6·8	5·31
29	6·28	5·1	6·39	5·2	6·32	5·16	6·7	5·32
30	6·29	5·1	6·39	5·3	6·32	5·17	6·5	5·32
31	6 29	5·0	...	...	6·31	5·17	6·4	5·33

PHASES OF THE MOON.

			H.	M.	
2 May	☽	Last Quarter	11	30	p.m.
9 „	●	New Moon	3	33	„
16 „	☾	First Quarter	0	13	„
24 „	○	Full Moon	3	39	„
1 June	☽	Last Quarter	8	25	a.m.
7 „	●	New Moon	11	16	p.m.
15 „	☾	First Quarter	2	19	a.m.
23 „	○	Full Moon	6	12	„
30 „	☽	Last Quarter	2	39	p.m.
7 July	●	New Moon	7	20	a.m.
14 „	☾	First Quarter	6	24	p.m.
22 „	○	Full Moon	6	37	„
29 „	☽	Last Quarter	7	35	„
5 Aug.	●	New Moon	4	37	p.m.
13 „	☾	First Quarter	0	1	„
21 „	○	Full Moon	5	14	a.m.
28 „	☽	Last Quarter	0	33	„

General Notes.

INJURY TO FOLIAGE BY BORDEAUX MIXTURE.

The Mycologist to the South-eastern Agricultural College, Wye, Kent—E. S. Salmon, F.L.S.—in a paper on the above subject published in the "Journal of the Board of Agriculture, London," ponits out that, in looking through the considerable literature on the use of Bordeaux mixture as a fungicide, he finds that, in all countries where it has been in general use for a number of years for spraying apples, reports have been published from time to time recording the occurrence of a certain amount of injury resulting from spraying in certain seasons. Such injury has been variously termed "Bordeaux injury," "spray injury," "scald," "burning," "spray russeting," "cork russeting," and "yellow leaf," and has been reported from most apple-growing districts of North America, Europe, Australia, Tasmania, and New Zealand. The injury, he says, becomes sometimes evident on the leaves, sometimes on the fruit, and then the appearances denoting the injury are described. Practical suggestions are given how to avoid the injury, and these are: (1) In spraying use less copper sulphate. Give 3—3—50 formula* for Bordeaux mixture a thorough trial. Spray in moderation; spray to cover the foliage and fruit with a thin film, and yet not have the trees drip heavily. So far as possible, the Bordeaux mixture should be used only in dry weather. Use equal amounts of lime and copper sulphate. Some varieties of apples may be sprayed without much fear of injury; others must be sprayed with great care. Distinguish between the varieties in spraying operations. Bordeaux mixture is the best fungicide known. Its use cannot be given up in fighting the apple "scab," even though it cause some injury; apple scab causes a far greater loss than "Bordeaux injury." Fruit-growers must remember that, although some success has lately been obtained in the United States with the lime sulphur wash as a fungicide for use in tender-leaved fruit trees, it is unquestionably inferior to Bordeaux mixture as a general fungicide. Spray directly the blossom has fallen, and, where necessary, again when the apples are about three-quarter grown. Use freshly mixed home-made Bordeaux mixture prepared from the best freshly burnt quicklime (in lumps).

RAINFALL AT MOSSMAN, 1910.

January, 41·67; February, 33·30; March, 20·36; April, 10·86; May, 5·00.

In future the Mossman statistics will be included in the list of rainfalls in the "Agricultural Districts."

Answers to Correspondents.

TO FIND THE CONTENT OF A ROUND SILO.

Find the area of the base, and multiply this by the height of the silo. To find the area of the base, square the radius and multiply by 3,146. Then multiply by the height of the silo.

Example: A circular silo is 12 ft. in diameter and 15 ft. high. The radius is 6 ft. $6^2 = 6 \times 6 = 36$; $36 \times 3{,}146 = 113{,}256$, which multiplied by the height, 15 ft. = 1,698·840 cubic feet—volume of silo.

* Equivalent to 3¾lb. copper sulphate; 3¾lb. quicklime to 50 imperial gallons.

ARTESIAN BORES AND THE PELTON WHEEL.

CANADIAN, Armidale—

From Mr. J. B. Henderson, Hydraulic Engineer, we have received the following information which we think fully answers your questions:—

The horse power of artesian bores can be determined only by repeated dynamic tests.

This is done by noting the static pressure and volume of discharge when the valve controlling the flow is fully closed, when the pressure will be at a maximum and the discharge nil, then successively similar factors are noted at intervals while the valve is being gradually opened until it is full open, when the pressure will be at a minimum and the discharge be a maximum. These operations may be reversed until the valve is fully closed as a check upon the former series of observations.

From these observations a point will be observed when the pressure and volume coupled will give the greatest horse power of the bore. Of course, the best results are usually obtained with the valve partially open. Only exceptionally large flows are likey to register an appreciable pressure when the valve is fully open.

From this it will be clear that a bore for driving a Pelton wheel must yield a powerful jet with high pressure; in other words, when there is little or no power lost by improper adjustment of the pressure and flow.

When last measured, the static pressure at the Thargomindah bore was 270 lb. per square inch when the valve was fully closed, but I am sorry that I cannot give the horse power, as the necessary observations have not been recorded.

As far as I am aware, Pelton wheels are successfully employed at the following bores:—

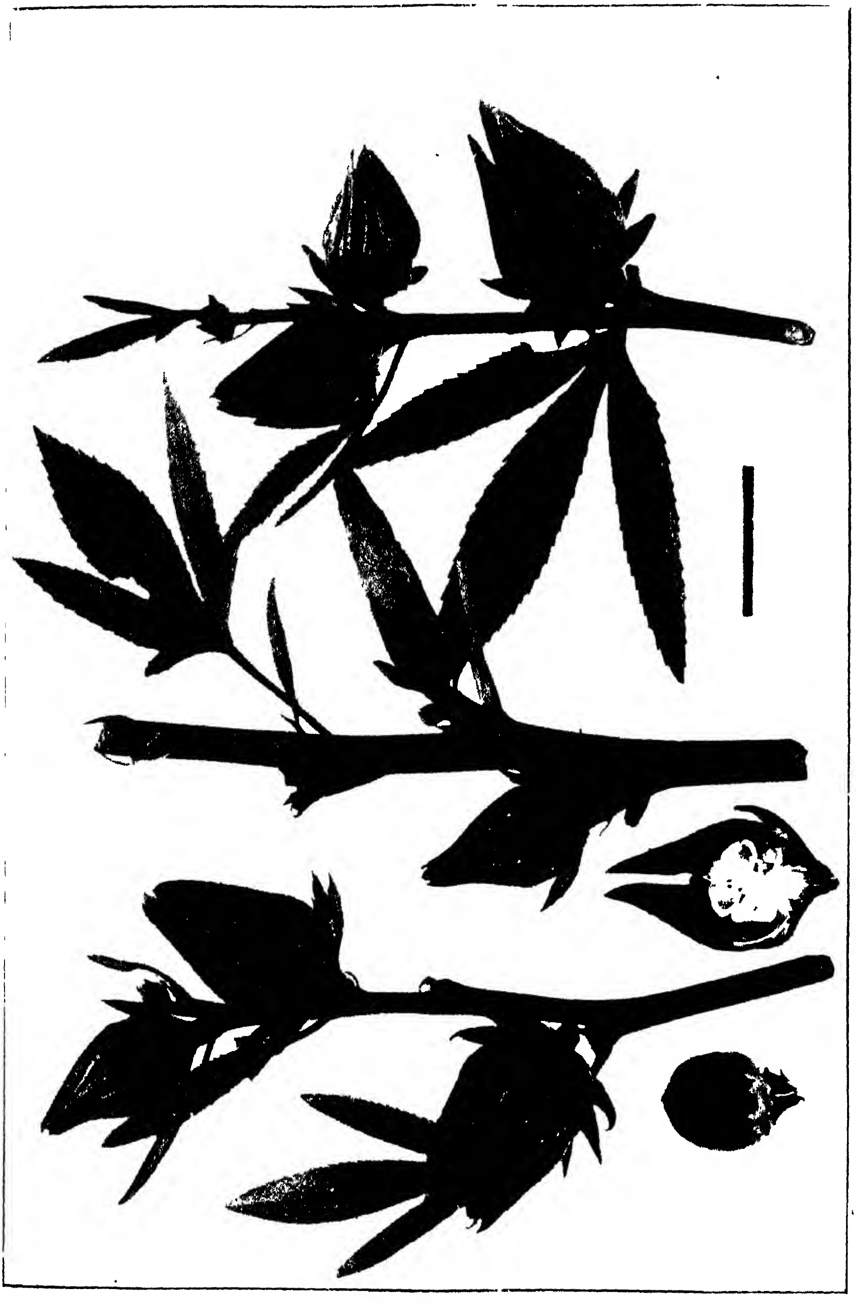
1. At Thargomindah, to drive an electric lighting plant, installed in 1898.
2. At Murweh Station, for working twenty stands of shearing machines. (*See* illustrated article in the "Pastoralists' Review" for January, 1910, page 1184.)
3. The Rand bore drives a small electric plant for lighting the station. What type of motor is used, I cannot say.
4. At Llanrheidol Station a bore drives an electric wool-drier. What kind of wheel is used, I know not.
5. At Hamlet Downs to drive a wooden water-wheel for actuating a chaffcutter.

The article in the "Pastoralists' Review" alluded to by Mr. Henderson is entitled and reads as follows:—

UTILISING THE FORCE OF ARTESIAN BORE WATER.

In November, 1908, we published a few particulars of how the pressure from artesian bores can be utilised for driving machinery. These notes were supplied us by Mr. Rowland Macansh, of Murweh Station, near Charleville, Queensland, who described how the force of No. 5 bore on that property is successfully used for driving twenty stands of shearing machines. This unique power has now been used for three successive seasons—this season 30,000 sheep were shorn—and there has never been a single hitch. The bore which supplies the force is down 1,792 ft., and the flow is estimated at 1,000,000 gallons. There is 6-in. casing in the bore, from top to bottom. The pressure from this bore, out of a 2-in. nozzle, is about 38 lb., and is as great now as ever it was. The force of water is directed on to a Pelton wheel made of solid steel,

Plate VII.



The Rosella in Fruit

2 ft. 6 in. in diameter and 9 in. wide. It is driven at 327 revolutions per minute, and develops equivalent to 18-h.p. The pressure gauge reads 36 lb. to 38 lb.; with only two-thirds of the flow passing through the wheel. Twenty stands of shearing machines are driven, but it is estimated that there is sufficient pressure to drive at least ten more. The water is also laid on to the shed, huts, and yards; indeed, the variety of uses to which it is put suggests many possibilities to pastoralists situated in the artesian area. Mr. Macansh's manager, writing last year on the efficacy of the power derived from the bore, said:—

"I am glad to say that the water wheel works splendidly; we are working it at 37 to 38 lb. pressure; that leaves us 8 lb. in reserve. I am really glad to say that when we started the wheel that we had not any trial of it previously, and there were men and the sheep in the shed. It went splendidly: not a man called out, 'let her go,' as they do with the engine. But I had run the wheel and the shaft, and had tried it with the speed regulators every time with all the friction wheels on the shaft. Although I was confident that it would go, I was anxious to see the wool in the machine, and the shaft running without a hitch. I must confess that I was very much relieved to think that it has gone without the slightest alteration to the wheel and the shaft. I now can say without the slightest hesitation that it will do the work splendidly. It has shorn the Gurley ewes and rams and the flock rams, and they are the most heavy-woolled sheep wo have."

It is therefore interesting to learn that this cheap and unique power continues to be successful, and that there appears to be no diminution in the pressure from the bore.

THE ROSELLA AND ITS USES.

"ROSELLA," Nambour—

The information you ask for is given in the issue of the journal for September, 1909. The plate illustrating the plant was unfortunately omitted, but you will find it on another page in this number. The season for rosella fruit is now over, and fresh sowings may be made next month.

TO FIND THE NUMBER OF PLANTS PER ACRE.

PLANTER, Gladstone—

The plants being set out at given distances in feet, all that is needed to find how many plants go to the acre is to divide 43,560 (the number of square feet in an acre) by the distance between the plants in the row, multiplied by the distance between the rows. For instance, plants are set in rows 4 ft. apart and the plants are 2 ft. apart in the rows: 4 times 2 = 8: therefore, each plant has a space of 8 square feet. Divide 43,560 by 8, and you have 5,445 plants per acre. If trees are planted 30 ft. apart each way, each tree has a space of 900 square feet, which, divided into 43,560, gives about 48 trees to the acre.

Sisal plants are planted at distance of 9 by 9 or 8 by 8 ft.

In the first case there will be 537 plants, and in the second 680 plants per acre.

MARCH ISSUE OF THE JOURNAL.

"SUBSCRIBER," Cairns—

We regret that the issue of the Journal for March, 1910, is exhausted. Perhaps we may be able to obtain a spare copy from one of our subscribers, whom we ask to note your request.

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	JULY. Prices.
Apples (Eating), per case	6s. to 9s.
Apples (Cooking), per case	6s. to 6s. 6d.
Bananas (Cavendish), per dozen	3d. to 5d.
Bananas (Sugar), per dozen	2½d. to 3d.
Cape Gooseberries, per case	4s. 6d. to 9s.
Citrons, per cwt.	11s. 6d.
Custard Apples, per quarter-case	2s. 6d. to 3s.
Lemons (Italian), per half-case	...
Lemons (Lisbon), local, per case	2s. 6d. to 3s.
Mandarins, per half-case	3s. to 4s.
Mangoes, per case	...
Nectarines, per half-case	...
Oranges (Local), per case	2s. to 3s. 6d.
Papaw Apples, per quarter-case	1s. to 1s. 6d.
Passion Fruit, per quarter-case	3s.
Peaches, per quarter-case	...
Pears (choice), per quarter-case	6s. to 8s.
Persimmons, per gin case	2s. to 3s.
Pineapples (Ripley Queen), per dozen	1s. 6d. to 3s.
Pineapples (Smooth), per dozen	1s. 6d. to 3s.
Pineapples (Rough), per dozen	1s. to 2s.
Plums, per case	...
Quinces, per case	...
Rosellas, per sugar-bag	9d. to 1s.
Strawberries, per tray	1s. to 1s. 6d.
Tomatoes, per quarter-case	1s. 3d. to 2s.
SOUTHERN FRUIT MARKET.	
Apples (Local), choice, per case	6s. to 7s.
Apples (Jonathan), per case	5s. to 6s.
Apples (Cooking), per case	3s. to 4s.
Bananas (Queensland), per case	13s. to 14s.
Bananas (Queensland), per bunch	3s. to 4s. 6d.
Bananas, G.M. (Fiji), per case	16s. to 17s.
Bananas, G.M. (Fiji), per bunch	4s. to 5s.
Cocoanuts, per dozen	2s. 6d. to 9s.
Grapes, per box	...
Lemons (Italian), per half-case	10s. to 11s.
Lemons (Local), per gin case	2s. to 3s.
Mandarins (Thorney), choice, per half-case	2s. 6d. to 3s.
Mandarins (Queensland), Emperor, per bushel case	5s. to 6s.
Oranges (Local), choice, per gin case	6s. to 7s.
Oranges (Queensland), per bushel case	4s. to 6s.
Passion Fruit (choice), per half-case	2s. to 3s. 6d.
Peaches, per half-case	...
Peanuts, per lb.	5½d.
Pears (choice), per gin case	6s. to 6s. 6d.
Persimmons (choice), per half-case	...
Pineapples (Queensland), Ripley, per case	4s. to 5s. 6d.
Pineapples (Queensland), common, per case	4s. to 6s.
Pineapples (Queensland), Queen, per case	4s. to 5s.
Plums, per half-case	...
Quinces, per gin case	...
Rock melons, per dozen	...
Tomatoes, choice, per half-case	2s. 6d. to 5s.
Water melons (Local), large, per dozen	...
Water melons, medium and small, per dozen	...
Strawberries (Queensland), per 3-quart tray	3s. 6d to 4s.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JULY.

Article.		JULY. Prices.
Bacon, Pineapple	lb.	6½d. to 8d.
Barley, Malting	bush.	3s. 6d.
Bran	ton	£4 2s. 6d.
Butter, Factory	lb.	11¼d. to 11½d.
Chaff, Mixed	cwt.	2s. 3d. to 4s. 4d.
Chaff, Oaten (Imp.)	"	3s. 6d.
Chaff, Lucerne	"	1s. 4d. to 4s.
Chaff, Wheaten	"	3s. to 4s. 3d.
Cheese	lb.	6d. to 6½d.
Flour	ton	£9 10s.
Hay, Oaten (Imp.)	"	£2 10s.
Hay, Lucerne	"	£2 10s. to £2 11s. 8d.
Honey	lb.	2¾d. to 3d.
Maize	bush.	1s. 9d. to 2s. 5d.
Oats	"	3s. 2d. to 3s. 8d.
Pollard	ton	£4 15s.
Potatoes	"	4s. 5d. to 7s. 9d.
Potatoes, Sweet	cwt.	1s. to 1s. 2d.
Pumpkins	"	1s. to 2s. 2d.
Wheat, Milling	bush.	3s. 9d.
Wheat, Chick	"	..
Onions	ton	£5
Hams	lb.	11½d. to 1s.
Eggs	doz.	1s. to 1s. 6d.
Fowls	pair	3s. to 4s.
Geese	"	6s. 6d. to 7s.
Ducks, English	"	3s. 6d. to 5s.
Ducks, Muscovy	"	...
Turkeys (Hens)	"	7s. to 8s.
Turkeys (Gobblers)	"	9s. to 15s.

ENOGGERA SALEYARDS.

Animal.	JUNE. Prices.
Bullocks	£8 to £8 17s. 6d.
Ditto (single)	£9 2s. 6d.
Cows	£6 5s. to £7 12s. 6d.
Merino Wethers	25s. 3d.
Crossbred Wethers	24s. 6d.
Merino Ewes	15s. 6d.
Crossbred Ewes	21s.
Comebacks	26s 6d.
Lambs	16s.

Farm and Garden Notes for September.

FIELD.—Spring has now arrived, and with it there will be the usual trouble with weeds, especially on carelessly cultivated, uncleaned ground. Therefore, the cultivator and the horse and hand hoe must be kept vigorously at work to check the weed pests and save the growing crops and much future labour. Attend to earthing up any crops which may require it. There may possibly occur drying winds and dry weather; still, good showers may be looked for in October, and much useful work may be done during the present month which will afford a fair prospect of a good return for labour.

Plant out *Agave rigida*, var. *sisalana* (sisal hemp plant) in rows 9 ft. by 9 ft., 8 ft. by 8 ft., or 6 ft. by 8 ft. apart, according to the richness of the soil. All dry places on the farm, too rocky or poor for ordinary crops, should be planted with this valuable aloe; especially should limestone country be selected for the purpose. If the soil is very poor and the plants very small, it is better to put the latter out into a nursery of good soil, about 1 ft. to 18 in. apart. Next year they will be good-sized plants. Keep down tall weeds in the plantation, and do not allow couch grass to grow round the roots. The sisal will do no good if planted in low, wet land, or on a purely sandy soil. It thrives best where there is plenty of lime, potash, and phosphoric acid, all of which can be cheaply supplied if wanting in the soil. Sow cotton—Sea Island—near the coast, and Upland generally; Caravonica succeeds best in Northern Queensland. Sow maize, sorghum, imphee, mazzagua, prairie grass, panicum, tobacco, and pumpkins. Sugar-cane planting should be vigorously carried on. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, ginger, and canaigre—the latter a bulb yielding a valuable tanning substance. Plant out coffee.

KITCHEN GARDEN.—Now is the time the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing most kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost; dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and stir the soil in the latter case early next day to prevent caking. Mulching with straw or leaves or litter will be of great benefit as the season gets hotter. It is a good thing to apply a little salt to newly dug beds. It is not exactly known what the action of salt is on the soil, but when it is applied as a top-dressing it tends to check rank growth. A little is excellent for cabbages, but too much renders the soil sterile, and causes hard-pan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow cucumbers, melons, marrows, and squashes at once. If they are troubled by the beetle, spray with Paris green or London purple. (*See* "Memorandum on Remedies for the Pumpkin Beetle" by Mr. H. Tryon, in this issue.) In cool districts peas and even some beetroot may be sown. Set out egg-plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

FLOWER GARDEN.—Continue to plant bulbs as directed last month. Protect the plants as much as possible from cold westerly winds, which may still occur, notwithstanding the increasing temperature, and see that the bulbs do not come in contact with fresh manure. Keep a good lookout for slugs. Plant out chrysanthemums, palms, and all kinds of tropical and semi-tropical

plants. If hot weather should ensue after planting, water and shade must be given. Sow dianthus, snapdragon, coleus. Roses will now be in full bloom. Keep them free from aphis, and cut off all spent blooms. This latter work should be done in the case of all flowers. If you wish to save seeds, do not wait for the very last blooms, but allow some of the very best to go to seed. If you have any toads in the garden or bush-house, encourage them to take up their abode there. They are perfectly harmless in spite of their ugliness, and they destroy an astonishing number of insects injurious to plants. Fill up all vacancies with herbaceous plants. Sow zinnia, galliardia, amaranthus, cockscomb, balsam, sunflower, marigold, cosmos, summer chrysanthemum, coreopsis, portulacca, mesembryanthemum, calendula, &c.

Orchard Notes for September.

THE SOUTHERN COAST DISTRICTS.

The marketing of citrus fruits, in the later districts, of the late winter or early spring crop of pines and bananas, also of strawberries and Cape gooseberries, will continue to occupy the attention of fruit-growers. I can only repeat the advice I have so often given in these Notes respecting the marketing of all kinds of fruit—viz., to grade the fruit evenly, pack honestly, and display it to the best advantage if you want to get good returns.

September is a very important month to the fruit-grower, owing to the fact that it is usually a dry month, and that it is essential in all cases to keep the land in a high state of tilth, so as to retain the moisture that is required by the various trees that are in blossom, thus securing a good set of fruit. Where irrigation is available, it is advisable to give the trees a good watering should the ground be dry, as this will induce a good growth and cause the fruit to set well. If an irrigation is given, it should be a thorough one, not a mere surface watering, and once the land is saturated the moisture must be retained in the soil by constant and systematic cultivation. If this is done, one good watering will usually be enough to carry the trees through in good condition to the thunderstorms that come later or even to the summer rains, if the soil is of a deep sandy loamy nature.

No weeds must be allowed in the orchard or vineyard at this time of the year, as they are robbing the trees and plants of both the water and plant food that are so essential to them at this period of their growth.

There is not much to be done in the way of fighting scale insects during the month, as they are more effectually dealt with later on; but where young trees are showing signs of distress, owing to the presence of scale insects, they should be treated, the gas method being the most efficacious.

Beetles and other leaf-eating insects often make their appearance during the month. The best remedy is to spray the trees or plants with one or other of the arsenical washes that are recommended by me in this journal. The vineyard will require considerable attention. Not only must it be kept well worked, but any vines that are subject to the attack of black spot must be sprayed from time to time with Bordeaux mixture. Disbudding must be carefully carried out, as this work is equally as important as the winter pruning, as it is the best means of controlling the future shape of the vine. A very common fault with vines grown in the coast districts is that the buds often remain dormant, only the terminal bud and possibly one other starting into growth, thus leaving a long bare space on the main rods, which is undesirable. When this takes place, pinch back those shoots that have started, and which are taken the whole of the sap, and force the sap into the dormant buds, thus starting them into growth. This will result in an even growth of wood all over the vine—not a huge cane in one part and either a stunted growth or dormant buds on the rest.

Every care should be taken during the month to prevent the fruit fly from getting an early start. All infested oranges, loquats, kumquats, or other fruits should be gathered and destroyed, as the keeping in check of the early spring crop of flies, when there are only comparatively few to deal with, will materially lessen the subsequent crops. Land that is to be planted to pines or bananas should be got ready now, though the planting need not be done till October, November, or even later. Prepare the land thoroughly; don't scratch the surface to the depth of a few inches, but plough as deeply as you have good surface soil, and break up the subsoil as deeply as you can possibly get power to do it. You will find that the extra money expended will be a profitable investment, as it will pay every time.

TROPICAL COAST DISTRICTS.

September is usually a very dry month, and fruit trees of all kinds suffer in consequence. The spring crop of citrus fruits should be harvested by the end of the month, as, if allowed to hang later, there is a great risk of loss by fly. The fruit should be well sweated; and, if carefully selected, well-graded, and well packed, it should carry well to, and fetch high prices in, the Southern States, as there are no oranges or mandarins grown in Australia that can excel the flavour of the best of the Bowen, Cardwell, Cairns, Port Douglas, or Cooktown fruit.

As soon as the fruit is gathered, the trees should be pruned and sprayed with the lime and sulphur wash, as this wash is not only a good insecticide, but it will keep down the growth of all lichens, mosses, &c., to which the trees are very subject.

Every care should be taken to keep down the crop of fruit-fly during the month. All infested fruit should be gathered and destroyed, particularly that in or adjacent to banana plantations. Watch the banana gardens carefully, and keep well cultivated. New land should be got ready for planting, and where land is ready planting can take place.

Papaws and granadillas are in good condition now, and, if carefully gathered and well packed in cases only holding one layer of fruit, they should carry well to the Southern markets if sent in the cool chamber.

SOUTHERN AND CENTRAL TABLELANDS.

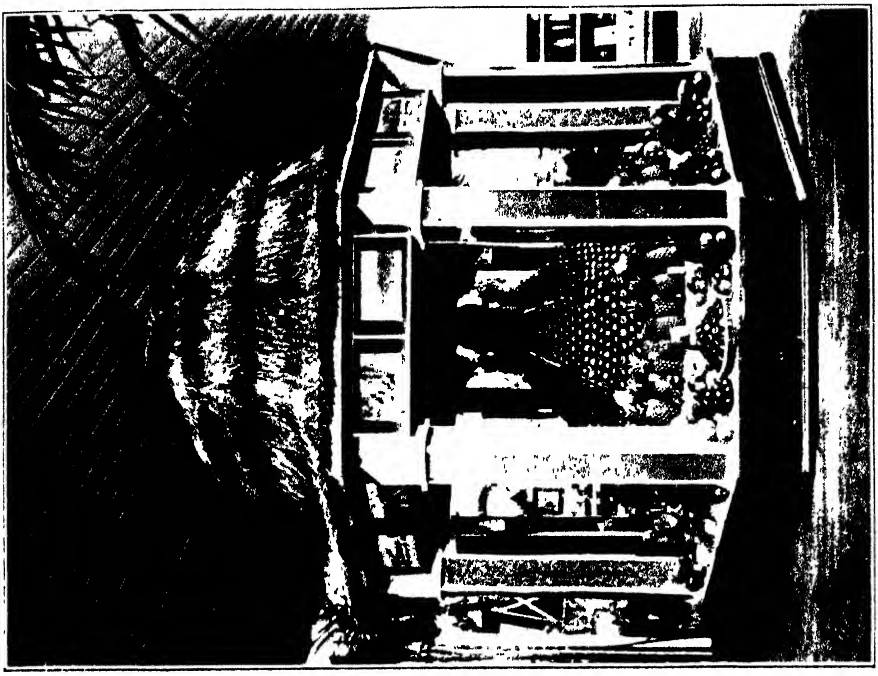
Prune grape vines at Stanthorpe in the early part of the month, leaving the pruning as late as possible, as the object is to keep the vines back in order to escape damage from late spring frosts. All vines subject to the attack of black spot should be treated with the winter dressing when the buds are swelling; this treatment to be followed by spraying with Bordeaux mixture later on.

Where fruit trees have not received their winter spraying, they should be treated at once before they come out into flower or young growth. Where the orchard or vineyard has not been ploughed, do so, taking care to work the land down fine as soon as it is ploughed, so as to keep the moisture in the soil, as the spring is always the trying time for fruit trees.

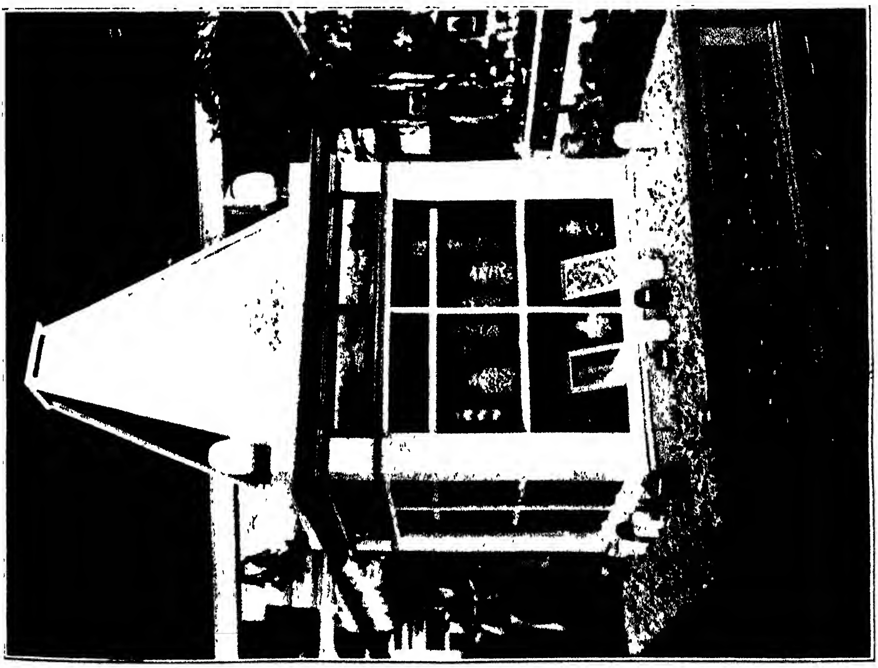
Look out for fruit-fly in the late oranges and loquats in the Toowoomba district. Keep the orchards and vineyards well cultivated; disbud the vines when sufficiently advanced. Spray for codlin moth.

In the Central tablelands irrigate vines and fruit trees, and follow the irrigation with deep, constant, and systematic cultivation. Keep down all weed growth, and fight the red scale on citrus trees with cyanide. The objective of the fruit-growers throughout Queensland during September and the two following months is, "How best to keep the moisture in the soil that is required by the trees, vines, plants, and vegetables;" and this objective can only be obtained by irrigation where same is available, or by deep, systematic, and constant cultivation where there is no water available for irrigation.

Plate VIII.

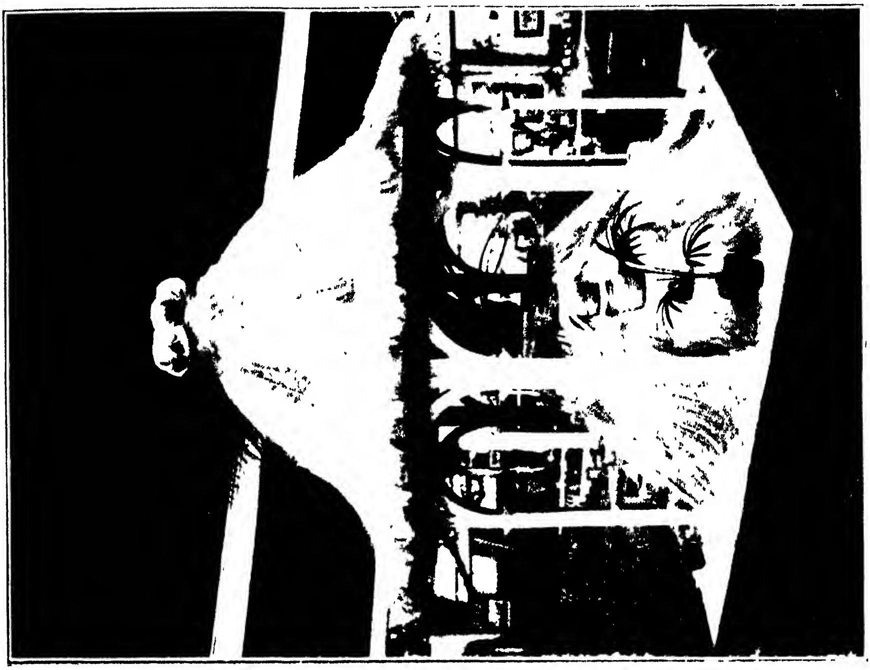


Agricultural and Fruit Trophy.

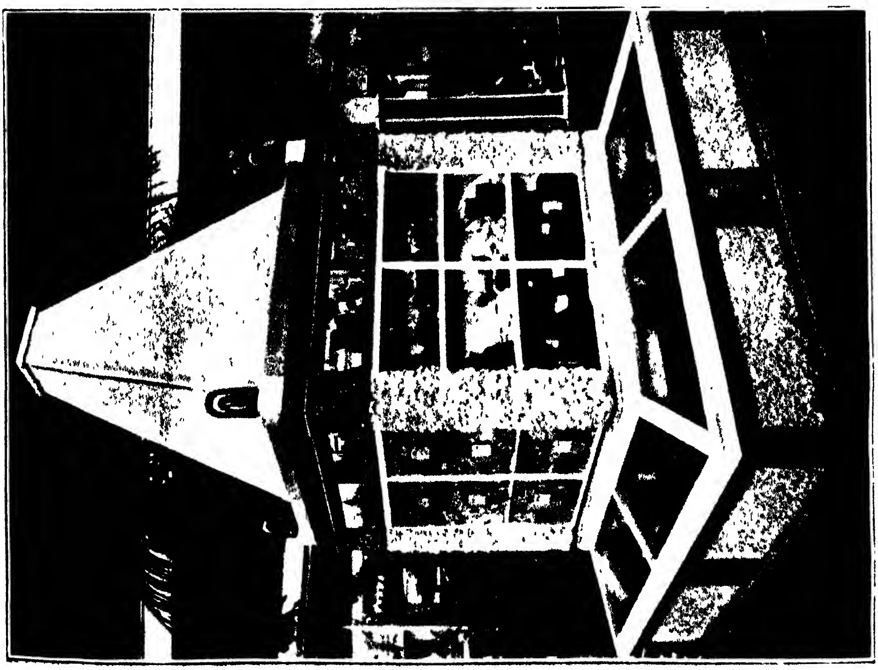


Sugar Trophy.

Plate IX.



Sisal Hemp Trophy.



Wool and Cotton Trophy.

Agriculture.

AGRICULTURAL EXHIBITS AT THE QUEENSLAND NATIONAL ASSOCIATION'S EXHIBITION, AUGUST, 1910.

For several years past, one of the most interesting and educative exhibits at Queensland's premier show has been that of the various agricultural districts of the State. The competition between these and district exhibits from New South Wales has always been very keen, and the greatest interest was taken in them by all classes of the community. This year, however, a notable departure was made, in that no general districts as a whole were represented, but their place was taken by what was termed "One-farm Exhibits." Probably more widespread interest was taken in these than in the former classes. The object was to show what could be done by individual farmers. No district was ransacked to obtain every conceivable product from a pincushion to a pumpkin, from a horseshoe to an engine, but everything shown was absolutely produced on the competing farm by the farmer and his family.

The result fully justified the new departure, and those who are unacquainted with the wonderful resources of the soil, and of the tillers thereof of Queensland and the sister colony, received what is termed in the vernacular "An eye-opener." There were seven entries for this competition, and doubtless next year there will be considerably more, considering the great success which has attended the experiment and the generous manner in which the exhibitors were treated by the executive of the National Association. The main incentive to the exhibitors, besides a proper pride in showing the world what individual effort on a few hundred acres could achieve, was the prize money, amounting to £100, to be divided between the competitors.

So satisfied were the Council of the Association with the excellence of the various exhibits that they unanimously decided to double the prize money, and, in addition, a non-competitive exhibit of great merit was admitted to a share of it. The greatest interest was shown by the public in this section, and particularly in two of them, which were so well arranged that it was evident the exhibitors were no novices in the art of displaying the various products of the farm to the best advantage. No doubt the judges had no easy task before them to arrive at a decision which, however, gave general satisfaction.

The seven competitors were:—Messrs. Prevost Bros., Moss Vale, New South Wales; Allen Bros., Gympie; T. F. Chaffey, Glen Innes, New South Wales; J. R. Martin, Cawdor, Aubigny; W. Fowler, Lakeside, Gayndah; T. Fisher, Coolabunia, Kingaroy; and ——. Meyer, Gayndah line; the latter exhibit was non-competitive. To enumerate the thousand and one products which were shown by each would simply be to name almost every article in the way of farm crops, fruit, vegetables, dairy produce, preserves, &c., &c., which can be produced in Queensland, tropical and subtropical. Nor were there wanting evidences of the skill of the exhibitors' wives, daughters, sisters, cousins, and aunts in all the departments usually in feminine hands on the farm—from needlework to pickles, jams, sweets; and in one of the competitors' stalls was shown a fine three-storied wedding cake. The following are the details of the

awards, showing the possible number of points, and the points gained by each competitor:—

—	—	Allen Bros.	J. F. Chaffey	T. Fisher.	W. Fowler.	J. R. Martin.	Prevost Bros.
Dairy Produce	45	14	31	39	27	25	29
Fruits	50	34	38	42	35	34	47
Fruits, Vegetables, and Roots, fresh and preserved	120	61	66	87	58	86	102
Grain	70	15	46	37	23	55	51
Tropical Products	30	29	..	6	24	2	2
Tobacco	10	..	5	5	2	...	7
Hay, Chaff, &c.	95	37	57	69	42	57	77
Wool	20	5	12	5	..	..	20
Women's and Children's Work	30	14	18	26	7	18	21
Drinks, &c.	10	8	7	7	7	9	7
Time and Labour-saving Useful Articles made on the Farm	10	...	5	6	10	2	10
Effective Arrangements of Exhibits	10	6	6	7	6	6	10
	500	233	291	336	241	294	383

STATE FARM EXHIBITS.

As usual the State Farms, the Agricultural College, and the Kamerunga State Nursery made an excellent display. It was possibly owing to the great boom in the rubber market that the tropical exhibits brought from Kamerunga, by Mr. H. Newport, the Instructor in Tropical Agriculture, who is also manager of the State Nursery there, attracted a constant stream of visitors, anxious to see and hear all they could about an industry which is drawing millions from capitalists in all parts of the world. Mr. Newport, who was in attendance day after day, had a busy time with these insatiable inquirers. Now that he has demonstrated practically that the rubber-tree is as much at home in North Queensland as in Papua, Brazil, and the Malay Peninsula, it is to be hoped that more rubber plantations will be opened up on the Northern rivers, where all the conditions of soil, climate, and rainfall are favourable to the rapid growth of the different varieties of rubber-trees, and especially of the Hevea or Pará Rubber. Wherever they have been planted in the North they have thriven well, and, judging by the numbers of plants which have of late years been distributed from Kamerunga amongst sugar-planters, settlers, and farmers, there should be some 30,000 trees scattered about on farms, plantations, and roadsides. Naturally, the question was frequently asked: "Can rubber be profitably produced in Queensland under white labour conditions?" This question must be answered with a reservation. It will probably not pay to plant largely as is done in countries where black labour is plentiful and wages low. But what is to prevent a sugar-planter, or a farmer, or a coffee-planter, or any other agriculturist in the North, planting a few hundred rubber trees on the outskirts or unutilised portion of the land from which he derives the main portion of his income? Whilst he is occupied with his main crops, those trees would be growing, and laying up a rich store of rubber to be drawn upon in six years after planting. No extra labour need be employed to look after them. Then why not plant rubber?

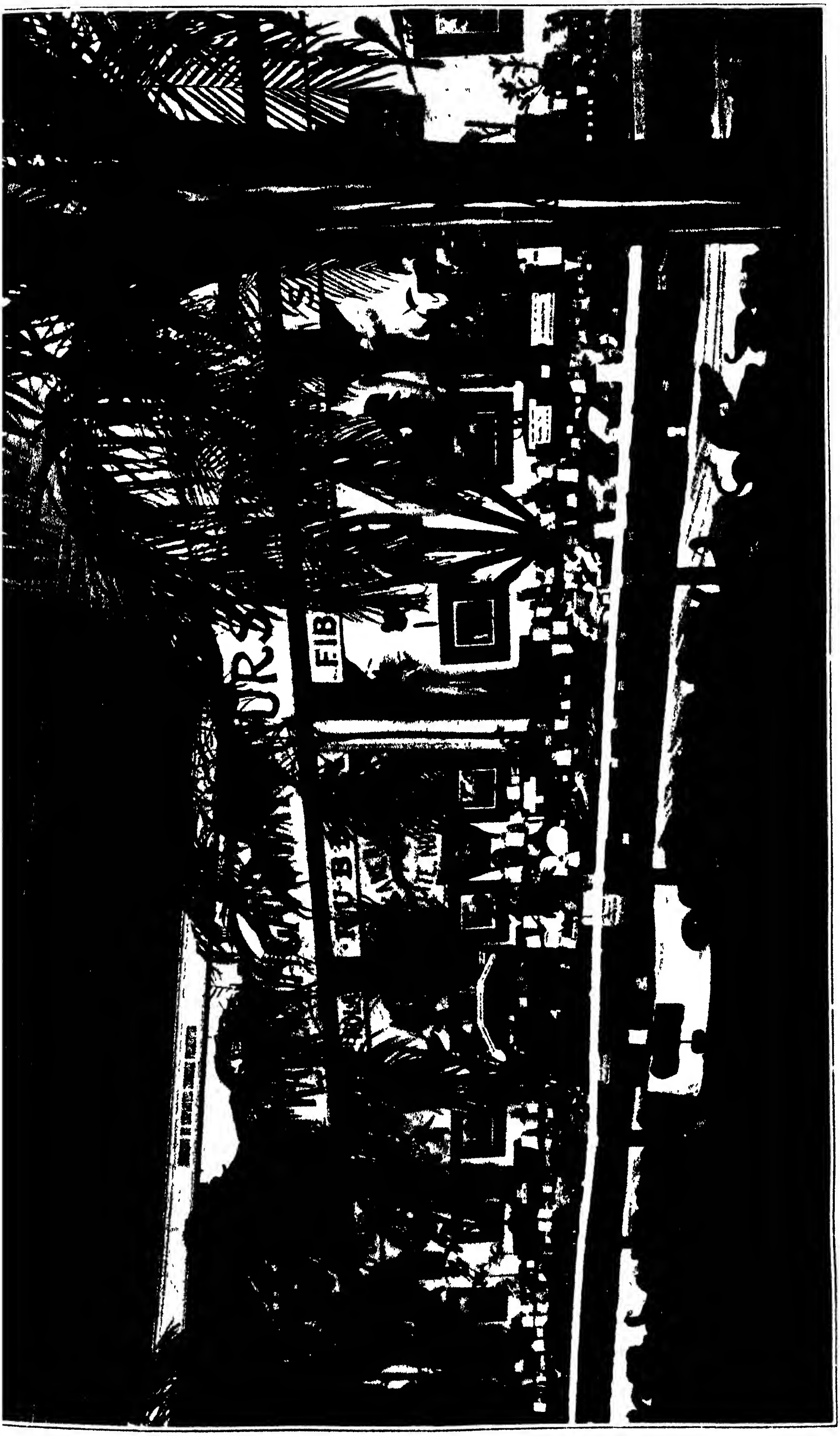
However, the whole question of rubber-planting—from the selection of land to planting, treatment of trees during growth, tapping and preparing rubber for the market—will be exhaustively dealt with in a pamphlet on the subject by Mr. Newport, which in due course will be issued by the Department of Agriculture and Stock.

Amongst the interesting exhibits in this section was a growing plant of the *Musa textilis*, the plant of the banana family from which the Manila hemp of commerce is produced. It goes without saying that bananas and plantains

Plate X.

State Farm Exhibits at the Queensland National Association's Exhibition, August, 1910.

Plate XI.



The Exhibits of Tropical Products from the State Nursery, Kamerunga, Cairns, North Queensland.

are at home everywhere on the coast lands of the State, but more especially do they thrive in the Far North, where *Musa textilis* only requires about twenty months to produce a first crop, after which the matured suckers, of which there are about twenty to each plant, will yield a crop every eight months.

Of brush-making fibres, several samples were shown, particularly of "Kitool" from various palms, notably the *Arenga saccharifera,* and Coir, the coarser staples and many others for yard or bass brooms, curry brushes, clothes and scrubbing brushes, door mats, &c. Such brushes, &c., of which quantities are made at the Blind, Deaf, and Dumb Asylum in Brisbane, are made from imported material, all of which could be grown in Queensland.

It is the same with oil-producing nuts—for instance, the peanut, which is a valuable oil-producer. These thrive well in the North, but it does not pay any grower to ship the nuts to the South, however much the oilmakers would like to have them. What should be done is to erect an oil mill at no great expense, and send the crude oil in drums to the Southern refineries; the resulting oil-cake would then remain as an additional source of profit to the grower or millowner, instead of going to swell the profits of the Southern buyer. Other oil nuts which do well at Kamerunga are Sesame, African Oil Palm nuts, castor oil, &c., &c.

Other tropical products in the Kamerunga exhibit were cassava in all stages, from the root to the prepared flour or starch; coffee, the African oil palm fruit, sisal and Mauritius hemp, rice, cocoanuts, and a great variety of edible and other beans and nuts of economic value, particularly the pods of the Divi Divi tree, which contain a large quantity of "tannin," which gives value to them as a useful material for the tanner; peanuts, beans, ivory nuts, and growing plants of several varieties of rubber, coffee, and coca trees, living vanilla vines showing the green pods, &c., manufactured rubber in several forms, and vanilla prepared for market. Besides these were a variety of knives used in tapping the rubber-trees. Taking the exhibit as a whole, we consider it to be most valuable and instructive, and distinctly ahead of similar exhibits in past years.

WESTBROOK, ROMA, AND HERMITAGE STATE FARMS.

The State Farms and Agricultural College exhibits occupied the remaining portion of the section occupied by the Department of Agriculture and Stock. The Acting Principal of the Queensland Agricultural College, aided by Mr. Brookes and a small band of willing student workers, made a display of the College products which was at once artistic and effective. Every advantage was taken of the particular feature to which each product lent itself for decorative purposes. Amongst these were most artistically made little bales of hay, which of themselves formed a very effective exhibition. Cotton, again, was beautifully arranged, being spread out in the shape of an open fan on a sloping base. Grasses, natural and artificial, adorned the background; whilst the exhibits of bacon, hams, cheeses, butter, eggs, &c., were interspersed with a wonderful variety of vegetables such as are rarely if ever seen in the Brisbane markets or shops. Amongst the pumpkin family, which was well represented by giants and dwarfs, were two or three fine specimens which had not before been shown amongst farm products at the Exhibition. These were Brooke's Improved Purple, and a very large green mottled variety. The students' work in wood, iron, and brass would have done credit to a professional joiner, blacksmith, or engine artificer. This class of work is carried on simultaneously with ordinary farm work and with theoretical instruction in the school. The farm work comprises everything connected with that branch of rural life, including the raising and feeding of stock—horses, cattle, pigs, sheep, and poultry—and instruction in veterinary science is also practically given. The important matter of ensilage-making is also thoroughly taught at the College, where several silos are erected, the samples from which showed

the great care taken in preparing this valuable fodder, the stand-by of the dairy farmer in unpropitious seasons. The cotton exhibits comprised Caravonica and Russell's Big Boll. The latter, on examination, appeared, however, to have been raised from mixed seed.

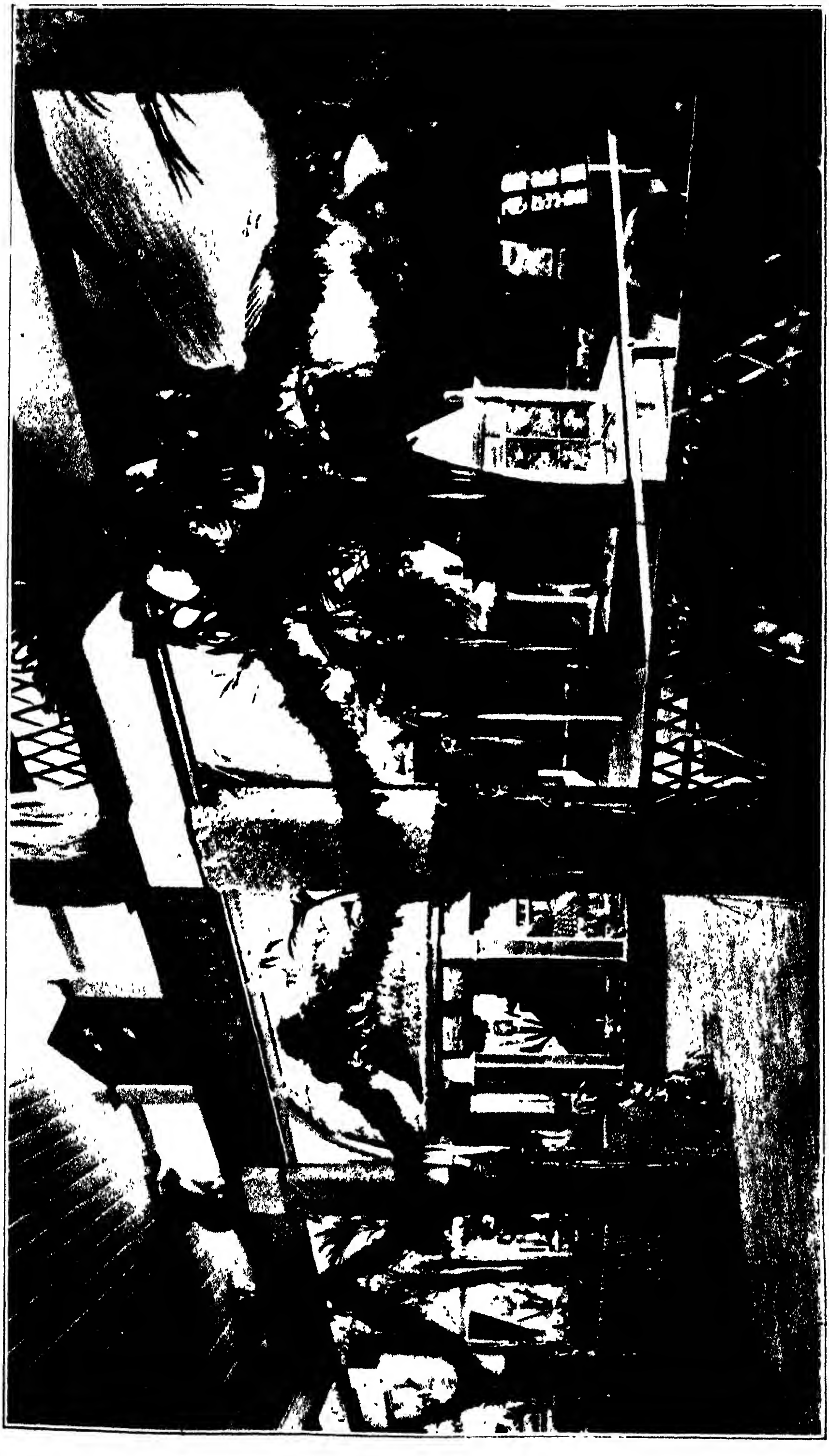
From what was shown of the College work at the Exhibition, it is clear that any youth of ability, perseverance, and enthusiasm who undergoes a three-years' course of study there cannot fail to pass out at the end of that term fully equipped with all the knowledge requisite to enable him to undertake and carry out successfully farming operations on his own account, or to manage a large dairy farm or butter factory. Every year some 75 per cent. of the students who complete the three-years' course either take up land on their own account or obtain appointments as managers of dairy farms, creameries, or butter factories. It would be well if a similar institution could be planted in the centre of the tropical district of Northern Queensland, where, in addition to the usual farm products of temperate climates, they would be able to study purely tropical agriculture.

The Westbrook, Hermitage, and Roma State Farms were equally well displayed by their respective managers. Hermitage, amongst other things, showed wool from the flock of purebred merinos presented to the Department of Agriculture and Stock some years ago by Mr. Slade, of Glengallan Farm. The manager, Mr. Liverseed, states that the sheep thrive well and duly increase and multiply. In these State Farm exhibits were to be seen the usual varieties of cereals, potatoes, grasses, millets, calabash gourds, wheat, pumpkins, vegetables, several varieties of seeds, olives, hay, chaff, ensilage, citrus fruits—notably some exquisite lemons of bright appearance, thin-skinned and of good shape—in fact, quite equal to any imported Italian lemons. When such fruit can be produced at the Roma State Farm, one wonders why the Maranoa has not long since made an effort to displace the imported fruit. This is the last occasion on which Mr. C. Ross, who has so long successfully managed the Hermitage and Westbrook State Farms, will undertake the arrangement of a State Farm exhibit at the Exhibition, as he has been appointed Instructor in Fruit Culture in succession to Mr. A. H. Benson, who has accepted the appointment of Director of Agriculture in Tasmania. Mr. Benson's many years of strenuous work in Queensland, especially in improving the position of citrus culture, will be now taken up by Mr. Ross, whose expert knowledge of fruit culture has been of such great service to fruitgrowers and vignerons not only on the Darling Downs, but all over the State. Mr. Mitchell, his successor at Westbrook, brings with him a life-long practical and scientific knowledge of the art of fruit-growing, which should make him a worthy successor of his predecessor.

This year, Mr. H. W. Mobsby, to whom was entrusted the arrangement of the Agricultural Department's section, made an entirely new disposition of the usual trophies at the entrance to the court, especially as regarded the blended harmony of colour--grey, relieved with white and gold. A glance at our illustrations will show how very effective this arrangement was. The sisal, cotton, wool, wheat, and fruit trophies were admirably built up to exhibit those products to be best advantage. Another trophy showed sugar in all its stages, from the cane to the manufactured and refined article, even to manufactured sweets. Mr. Mobsby's experience in arranging show courts at the A.N.A. Exhibitions in Sydney and Melbourne, and particularly at the late Franco-British Exhibition at Shepherd's Bush, London, has been of the greatest service to all classes of exhibitors.

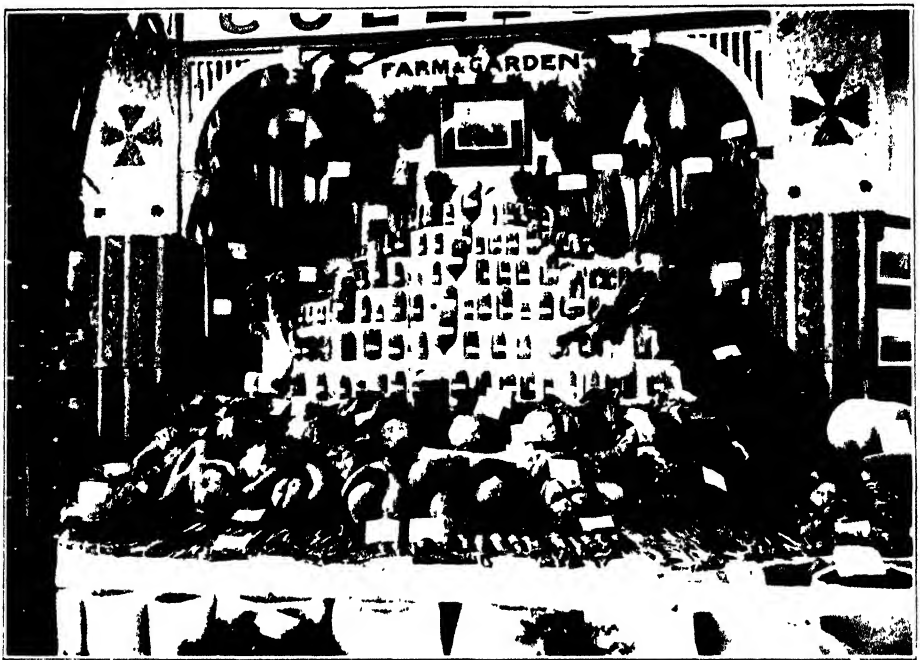
Space will not allow of a very lengthy notice of all the exhibits of the Department of Agriculture and Stock, but the foregoing will give some idea of what was achieved by its officers in the way of advertising Queensland's resources to the many thousands of visitors from all parts of the Commonwealth to the Exhibition of 1910.

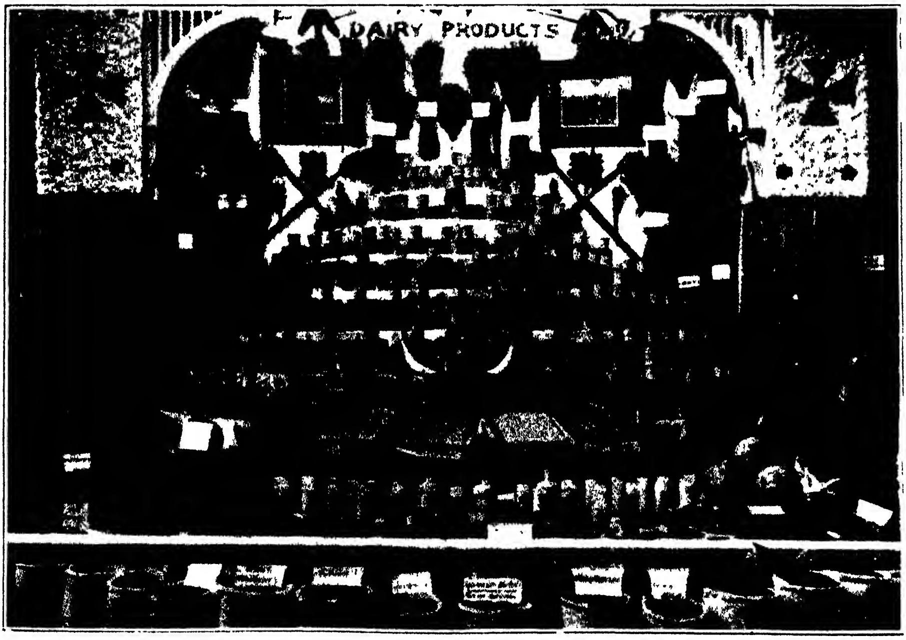
Plate XII



THE AGRICULTURAL COLLEGE SECTION, QUEENSLAND NATIONAL ASSOCIATION'S EXHIBITION, AUGUST, 1910.

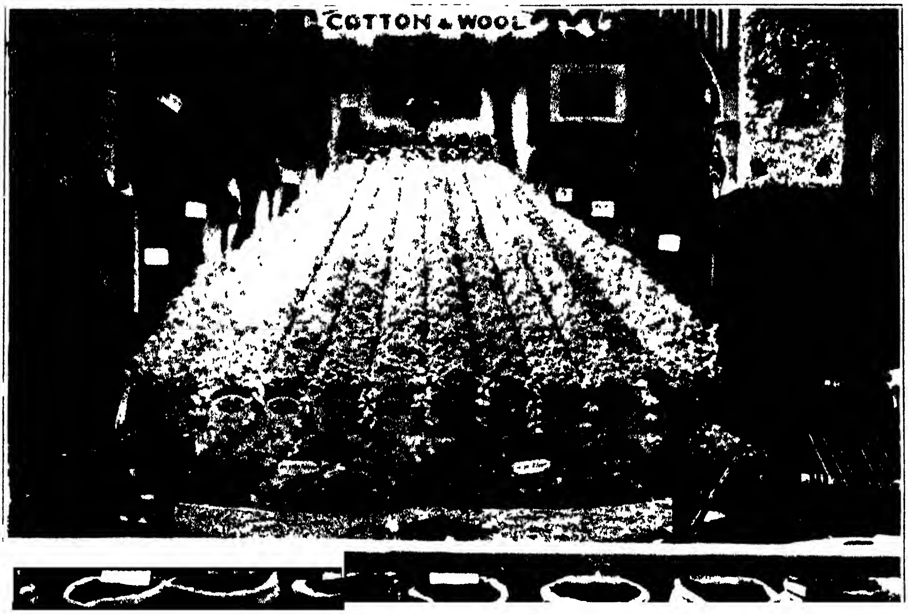
Plate XIV.





DAIRY, FARM, AND GARDEN EXHIBITS OF THE QUEENSLAND AGRICULTURAL COLLEGE

Plate XIII.



Cotton Exhibit, Queensland Agricultural College.

Bacon and Hams, Queensland Agricultural College.

SOME FACTS ABOUT QUEENSLAND.

The following interesting letter addressed to the "Farmer and Grazier," Melbourne, by Mr. W. S. Bradley, of "Wendouree," Brigalow Creek, Blythedale, *viâ* Miles, an ex-student of Longerenong Agricultural College, will show that the Victorians who have taken up land in Queensland are well satisfied with their prospects, even when located at a distance of over 50 miles from a railway station. Mr. Bradley writes:—

I arrived here safely last week, and during my passage here saw a good deal of the country, some of which is poor, but the bulk of what I saw appears to be excellent land, and grows an abundance of grass. We have four blocks, each with a creek frontage, containing altogether 7,000 odd acres, on which there is nothing to pay for 5 years. After that we have 10 years to pay off, the average price of our land being 7s. 6d. an acre. The land is something after the Goulburn Valley soil, and everyone round here is perfectly satisfied with it. We have a good deal of open box country, whilst in other places the scrub is fairly thick. The timber mostly in evidence is yellow box, gum, brigalow, wilger, belar (something like a pine, it has needles very much like a pine), and sandalwood. The latter is a good standby in case of drought. I believe the sheep fatten on it very quickly. There is plenty of grass here, a lot of it being 5 and 6 ft. high; kangaroo and tall oat grass in plenty. I have not seen a lean cow since I have been here; all are rolling fat, and are mostly used for beef, and the settlers have no objection to one running in a few and milking them. On my way out I saw a lovely crop of maize. I hear it does very well up here. We have not tried any, but I should like to put in a few rows of various varieties, to see how they do. My brother bought 150 sheep (ewes in lamb and wethers), from 2 to 6 tooth, for 4s., two months ago, in very poor condition, and they are picking up very well. We are just finishing our first paddock of 150 acres, and we all feel proud of the fence. I often wish I were back at the College again, but there is nothing like working for yourself, and knowing that every stroke you do is for your own good. We have a good supply of water with our creek frontage. The creek has just stopped running, but we have about a dozen waterholes full, and, although there was a drought last year, my brother says there was a lot of water in them. Many men make their living out of snaring opossums, for which they get 35s. a dozen. We intend to set a number of snares, and hope to make a little, which will come in handy, as money seems to go, and you hardly seen any return for it.

At present we are 53 miles from a railway station, but by Christmas the Dalby-Tara railway will be completed, and this will bring us within 25 miles of Tara. The opinion of most people is that the railway has nothing to stop for at Tara, and will continue on. We will then be from 2 to 10 miles from a station, and this only should increase the value of our land very much. Should any of the students care to know anything about Queensland, I will try and find out for them what they desire to know. We are having glorious weather; it is just like spring. We had our first fog (very slight) this morning, but that soon cleared away, and the sun was quite hot. There are a number of Victorians here, and more seem to keep coming. The boat ("Wryeema") that we came over in was full, and in addition had about fifty shakedowns. Most of the passengers got off at Brisbane, and a few went on to Cairns.

THE BRITISH COTTON-GROWING ASSOCIATION.

The Fifth Annual Report of the above Association, for the twelve months ending 31st December, 1909, has just reached us. It contains much that should serve to encourage Queensland farmers to enter vigorously upon the prosecution of an industry which, in Queensland, demands little capital, and

which owing, to various causes, is becoming every year more and more profitable. It will be remembered that when, a few years ago, Mr. Bottomly, representative of the Association, visited Queensland, with the view of ascertaining whether the operations of the Association could be profitably extended to this State, he reported unfavourably on the enterprise, solely on the ground of labour conditions. It is naturally to be concluded that that gentleman viewed the matter from the wealthy planters' point of view, which means large plantations, black labour, and big capital. He apparently overlooked the fact that large plantations proved a decided failure when cotton-growing was first undertaken in Queensland, and that the considerable exports of the staple from Southern Queensland were the aggregate result of the cultivation of cotton in small areas by farmers who made it an adjunct to their general farming business. In those days, the largest cotton field did not embrace more than about 20 acres; but there were few farmers who failed to make a net profit of at least £6 per acre from this crop. We have frequently pointed out that black labour was—except in one instance, that of the Manchester Cotton Company in the South-eastern district—never employed in cotton-growing in Queensland, and we have furthermore demonstrated the incontrovertible fact that, under white labour conditions, only 2 or 3 years ago, the farmers who grew cotton under the auspices of the Department of Agriculture and Stock cleared on an average £9 per acre. During this year a Victorian settler in the Condamine district of this State planted 2½ acres of cotton as an experiment, and realised £9 per acre for his crop. With such examples before us, who shall say that cotton-growing by farmers will not pay in Queensland? In the report under notice we read:—

"If any further proof were required of the necessity for the work of the Association, the recent failure of the crops both in America and Egypt have now proved, even to the most sceptical, that the very existence of the Lancashire cotton trade depends on new cotton fields being developed as rapidly as possible in other parts of the world. . . . . Notwithstanding the limited means [£10,000 per annum from the Imperial Government in addition to £150,000 raised by other means—Ed. Q.A.J.], certain fields, particularly in Nigeria, Uganda, Nyassaland, and the West Indies [all black labour countries—Ed. Q.A.J.] have been sufficiently proven to justify the hope that, with adequate capital, they will be largely developed. There, however, remain other fields [Queensland apparently not included—Ed Q.A.J.] in which a large amount of pioneering work is still necessary. In view of the very serious position in which the Lancashire cotton trade was placed owing to the failure of the American and Egyptian crops, the council decided last September (1909) to issue a further appeal for capital, and the cotton trade was asked to subscribe on the following basis:—

Spinners, £2 per 1,000 spindles, spread over 5 years.
Manufacturers, 1s. per loom, spread over 5 years.
Operatives, 1s. 3d. each. . . . . .

The council are glad to report that their appeal has been most generously responded to, and the capital of the Association to-day, stands as follows:—

Subscribed up to November, 1909	£262,000
To be subscribed by members of the federation ...	72,500
To be subscribed by members of the North and North-east Lancashire Association	30,000
Other subscriptions promised or received ...	100,861
Balance	465,361
Balance to be raised	*34,639
	£500,000

* Towards this amount it is expected that the operatives will raise £30,000.

The financial statement presented by the council is:—After deducting the whole cost of experimental and pioneering work, the income and expenditure account shows a deficiency of £2,183 2s. 7d. as compared with £23,976 9s. 2d. in 1908. The council have, however, decided to carry a further sum of £6,000 to reserve account to meet possible losses on investments in subsidiary companies and advances to planters. After payment of interest on capital borrowed from the ginning company—amounting to £6,238 5s. 6d.—the total deficit on the year's working amounts to £14,421 18s. 1d. as compared with £31,647 1s. 4d. in 1908.

We next have a report on the work of the Association in the colonies.

From this, it would appear that for several reasons, the cultivation of Egyptian cotton in Scind (India) has not shown any extension in acreage, and that lately, no progress has been made in Ceylon. In the West Indies there was a considerable reduction in acreage owing mainly to many planters rushing into cotton-growing, when high prices were ruling, and planting a larger acreage than could be efficiently supervised. The industry in Lagos appears to be on a satisfactory footing, 12,000 bales of 400 lb. having been produced in 1909, as against 6,000 bales in 1908. It is to be noted that the council state that experimental work at Ibadan, at the cotton seed oil mill, has not been satisfactory. It would seem that no oil mill can pay in Africa unless there is a local demand for the oil and cake.

In Southern Nigeria the production of cotton does not advance as rapidly as could be wished, and there is a hint of abandoning production in the Illushi district. Thanks to the grant of £10,000 per annum from the Imperial Government, the council have been able to arrange for the continuance of their work in this district for a further period of three years.

In Northern Nigeria, the report says that the quantity of cotton produced in 1909 has decreased, and, that, owing to insufficiency of capital, the staff had to be reduced and the expenditure cut down.

In British East Africa, no great progress has been made in cotton-growing on the coast, and consequently the British East Africa Corporation has extended its operations to Kisumu (on Lake Victoria) and to Uganda. Owing to the failure of the coast crop, the corporation's operations resulted in a heavy loss, and it was decided to reduce and write down the original capital, of which £10,000 was held by the Association. In Uganda the production of cotton continues to increase, but here again there is a pessimistic note sounded.

The report says:—"Unfortunately for the industry, severe competition has arisen amongst the buyers, which, in the long run, will do no good to the industry. Prices are now being paid to the native producer, which, even at the present inflated value of cotton, leave little or no margin of profit. Sooner or later, European prices will fall to a lower level, and the buying price in Uganda will have to be reduced. It is much to be feared when this happens that the native producer may give up planting cotton in exactly the same way as some of the West Indian planters have returned to sugar-growing instead of the cultivation of cotton."

From Nyassaland there are more favourable reports. Here, substantial financial assistance has been given to various planters, and thereby considerable losses have been incurred, but still, advances to planters are to be continued as before. The council have to regret that the operation of the Rhodesia Company have not been entirely satisfactory, and it would seem that better results will be obtained in the long run by encouraging native cultivation rather than by growing cotton on plantations managed by Europeans. In Egypt and in the Soudan the cotton industry is said to be declining, and the situation is a most serious one. For some reason or other the productiveness of the Delta is going down year by year. The report concluded by saying that the council were compelled to restrict their expenditure in every way, and had to refuse, absolutely, the undertaking of any new ventures. Further, they had no choice but to restrict the expenditure on some

of the work already undertaken. During 1909 the total amount of cotton produced more or less directly under the auspices of the Association was 30,000 bales of 400 lb., valued at £450,000.

This report gives rise to the thought of what might have been the position of the cotton industry in Queensland to-day, if a portion of the great expenditure on experimental work in Africa and in the West Indies had been allotted to Queensland. There are very few farmers who would have declined to plant a portion of their farms with cotton, if they had received the generous financial support which the Association extended to African and other planters. The result to-day would probably have been that cotton would have been grown from one end of the State to the other, both on the coast and inland, and that thousands of bales would be now being exported annually, instead of the small amount exported in 1908, which amounted in value to only £337. The small modicum of assistance granted to a hundred farmers by the Department of Agriculture and Stock was amply rewarded by the value of the crops realised, and had it been possible to, for a time, make regular advances to the farmers for the especial purpose of cotton-growing, the industry would long ago have been self-supporting, and Queensland would now be reckoned amongst the great cotton-producing countries of the world.

The idea, however, that cotton, sugar, tobacco, and other tropical products can only be successfully produced by the aid of black labour is so rooted in the British mind, that it is hopeless to expect that British capital will be invested in a White Australia (except in mining ventures), notwithstanding the obvious fact that sugar-growing under white labour conditions was never so profitable to grow and manufacture in the days when kanaka labour was employed.

THE MAIZE PLANT AND ITS PRODUCTS.

Generally speaking (says the "Bulletin Agricole," Mauritius) people have no idea of the thousand and one ways in which the Americans utilise maize. This plant is to them more precious than is the bamboo to the Orientals. Nothing is lost. In a similar fashion the people of Natal, who propose to turn to profit the bagasse from their future maize-sugar factories into cellulose, nothing doubting but that vast quantities of this article are prepared in Philadelphia from the pith of maize stalks, and that the Americans utilise this cellulose in the manufacture of smokeless powder, in the preparation of a well-known varnish, and also for pyroxyline. The pith is even used for belting in armoured ships, and also as insulating material in cars, refrigerating chambers, ships' holds, electric dry batteries, and as casing and pipes of steam generators. It also enters largely into the manufacture of a washable floorcloth superior to linoleum.

Besides being put to these uses, the pith of the maize stalk is used in enormous quantities in dynamite factories under the name of "woodmeal." In 1906 the general works manager of the great dynamite factory at Modderfontein (Transvaal) stated officially that he was prepared to give preference to South African farmers, at the same price, for a considerable supply of woodmeal, which he was obliged to import, if he could obtain from them in equal quantities woodmeal made from maize cobs, ground to an impalpable powder.

Although South Africa produces enormous quantities of maize we question if any business has been done with this dynamite factory. To continue. The spathes or husks covering the cob, not only serve to stuff all the mattresses and sofas of America, but it appears that from these husks are manufactured tissues, curtains, straw mats (as artistic as they are durable), elegant hats for ladies, and, above all, a tough parchment paper for envelopes and bank notes (Simmonds).

The stalks, leaves, &c., are used in a thousand industries. Every part of the plant is utilised. As to the grain, a simple enumeration of the transformations which it undergoes would fill several pages of this journal. From it is made cornflour, which finds its way into all puddings, notwithstanding the severity of the American pure food laws, hominy or corn meal, which is our simple ground maize, and this is sold in pretty boxes and used for those breakfast foods which are more and more appreciated in America as well as in Europe. Furthermore, starch is extracted from it, and this gives rise to a considerable industry, the factories which prepare it turning out annually from eight to ten million dollars' worth.

Another product of the grain is dextrine for fixing the colours in cloth, &c. Whisky, eau de Cologne, &c., are distilled from it, for which purpose alone more than six million dollars' worth of grain are used.

Enormous quantities of glucose are manufactured from it, and this actually finds its way to the tables of fashionable Americans under the name of golden syrup.

The grain also is made to produce a bright, tasteless oil, which, it appears, is largely used in adulterating olive oil, cod-liver oil, &c.

Finally, rubber is extracted from it. An American writer says: "By vulcanising corn oil, a large New York firm is now manufacturing a substance which appears to be a satisfactory 'filler' for india rubber." That is to say, that, by vulcanising maize oil a substance is obtained which, to a great extent, takes the place of rubber, especially where too great a degree of elasticity is not required in the goods thus manufactured.

Briefly, every conceivable product is obtained from maize, except crystallised sugar, and experience having proved that the sugar of the plant rarely granulates, it was decided that it would pay better to transform it into golden syrup, than to work against Nature for only a trifling advantage.

SPRAYING POTATOES.

The right time to spray potatoes depends upon the growth of the plants. Some may be inclined to wait until the latter are full grown, but this is simply courting disaster. By that time, the disease, if present, will be beyond cure. As recommended by the Government Vegetable Pathologist, Mr. H. Tryon, in his paper on the treatment of potato blight, in the March issue of this journal, the time to spray is, at first, when the plants are 6 in. high, and before any appearance of the disease, and the operation should be repeated once or twice later on so as to cover all the new growth. It must not be forgotten that a preliminary precaution is imperative. First, seed potatoes should not be obtained from an infected district, and, secondly, the "seed" should be treated with a solution of corrosive sublimate prepared by dissolving 2½ oz. of the sublimate in about 12 gallons of hot water, and after an interval of ten or twelve hours, diluting with 12 gallons of water. The potatoes are simply immersed in the solution for one and a-half hours, then spread out to dry, and planted.

For a spraying fluid an English journal advises 24 lb. of sulphate of copper, 30 lb. of pure washing soda, and 120 gallons of water for 1 acre. Great care is advisable in the mixing, or the liquid may be spoilt. The copper sulphate should be dissolved first, say, 8 lb. in a 40-gallon paraffin barrel nearly full of water; then 10 lb. of washing soda should be dissolved in a bucket, in, say, 3 gallons of water, and this should be slowly poured into the copper sulphate, stirring all the time. If the washing soda is not quite pure, rather more (1 lb. or so) may be required, but this can be tested by dipping a piece of litmus paper into the solution after mixing. If it turns red, more soda is wanted; if it remains blue, it is all right.

PICKLING POTATOES.

Whilst all the resources of science are being brought to bear on the subject of combating the disease which has had and still has such a fatal effect upon the potato crops of the State, it is nevertheless the duty of everyone interested in the farming industry to experiment and to make public whatever success may have attended his work. The following accidental discovery made by a West of England farmer is recorded in the "Bideford and North Devon Weekly Gazette" of April last:—

We have for years been pickling our seed wheat with a solution of bluestone as a preventive of one form of "smut" in the succeeding crop of wheat, and we have been spraying plants in the growing stage with all kinds of decoctions for the purpose of killing various fungoid diseases, but it never occurred to us to try the treatment with seed potatoes. Mr. Eldred Walker—a noted farm journalist—writes this week to say that an old farmer in the West of England confided to him a discovery he had made in this line. He set a lad to pickle wheat with a bluestone solution in the usual way on a granary loft: the boy made a mess of the job and some of the solution dripped through the floor on to a heap of seed potatoes in the house below. With great doubt in his mind the farmer planted those potatoes and was amazed to find they grew a crop immune from disease, while the rest of the field was rotten. Every year thereafter, therefore, he made a strong solution of bluestone, dipped his seed potatoes into it long enough to get thoroughly soaked through the dirt, and found this an effectual preventive five times out of six.

WORTHY OF TEST.

It is manifest that the spores of the fungus adhere to the setts and thus start the disease readily in the young tubers as the crop grows, and killing these spores with a bluestone dressing gives the next crop a clean start. The spores blown by the wind, which attack the leaves, do not reach the roots, as it is only those washed down through the soil that can give the disease to the tubers below. The Jansen system, in vogue some years ago, consisted in ploughing a furrow on to the top of the row of potatoes (bending the tops to the side) so as to put a great depth of soil above the roots to prevent access of spores from the top. This is a matter worthy of test. What strength of solution would just suffice to kill the spores adhering to the seed, what limit of strength must not be exceeded for fear of killing the "eyes" of the setts, what would be the effect on sprouted or "boxed" seed, and so on, are all points for investigation. The whole matter is quite on the same lines as we are accustomed to in pickling, spraying, &c., now so largely followed in many other places, and its very ease and simplicity should commend it. The wonder is that no one ever thought of it before.

The above treatment of seed potatoes is simple and easy of application. It would be a very simple matter to give it a trial in the coming planting season.

SORGHUM: ITS USE AND CULTIVATION.

Sorghum as a fodder crop, has got rather into disfavour, owing to its having become more widely known that it sometimes contains poison in dangerous quantities. It is, however, only in its immature stage that it is dangerous, and whatever poison it contains is dissipated or rendered harmless in the silo.

For the past 6 years sorghum has formed the principal roughage for stock on this farm, and there has been no accident. I make a rule never to feed it unless half in flower, and to start feeding it gradually, when changing from any other feed. Sorghum has been siloed here when not one-fourth of it was in flower, and the resulting silage was fed satisfactorily to milkers. Our agricultural chemist also tells us that molasses mixed with immature

sorghum neutralises the poison, and that, in case of an accident, molasses given as a drench is an antidote.

There are many varieties of sorghum, each having its own characteristics, the best known being, probably, Planters' Friend or Imphee, and Amber Cane. It does not follow, however, that these are the best varieties, my own experience being in favour of the Collier and Early Orange varieties. In dealing with sorghum varieties, however, one has to remember that they hybridise very readily, and that many persons are growing sorghum under a variety of names to which it has not the least title. Hybridisation among the sugar sorghums does not, perhaps, matter very much, but if they get hybridised with broom millet, which will happen if the two are grown at all close together, the feeding value will be much reduced. Sorghum may be utilised for fodder with or without the aid of silage stacks or silos, but it is in connection with these that it is of the greatest value.

If there is no intention of making silage, sorghum should be sown about Christmas time, or perhaps later (depending upon the date when the first frosts may be expected, as it is necessary that it should be in full flower before that date). The first cutting will then serve for autumn and early winter feed, and the second for spring feed.

Where silage is to be made from the first cutting, it will be found best to sow in October, or even earlier. The first cutting will then be ready for siloing in January, or early in February, and the second cutting will provide feed well into the winter. As a silage crop sorghum is hard to beat. I know absolutely nothing that will give a greater bulk of green stuff to the acre. If cut at the right time—*i.e.*, when in full flower—it is superior to green maize which has no cobs, but not equal to maize with a fair setting of cobs. It is a more certain crop than maize, as it is less liable to be injured by dry weather. The first cutting will, on the average, give a heavier yield than maize; and the second cutting, which often equal the first, is got with no more work than a scuffling between the rows. It is not so important that sorghum should be cut at the critical moment, as is the case with maize, but while it is advisable to cut it when in full flower, or early seed, it may, in case of necessity, be left standing for some time, and makes very fair silage when dead ripe.

When chaffing sorghum for silage I would advise, where practicable, feeding cowpea or lucerne at the same time through the cutter, as either of these improve the feeding value of the silage. Green cowpeas are rather difficult to put through the chaffcutter by themselves, but they draw through nicely if fed to the machine on top of a light feed of sorghum, and the mixture makes most excellent silage.

Sorghum is a strong growing plant, and will perhaps allow more liberties to be taken with its cultivation than almost any other crop; but to get the best and most uniform results, the land should be well prepared, and the seed sown in drills 3 ft. apart. Twelve pounds of seed will sow an acre; if sown too thickly the canes grow too thin and are apt to fall, making the crop very difficult to harvest.

The time of sowing, as before mentioned, must depend upon the use to which the crop is to be put; September or October for silage and autumn feed, and December or January for autumn and spring feed.

It is better to sow in rows than broadcast for several reasons, the principal being, that the surface can be kept moved, and loose, in a manner that is quite impossible in a broadcasted crop, and in this way a drilled crop may be satisfactorily brought through a dry spell that would practically ruin a broadcasted one. Again a crop sown in rows can be cleaned if necessary, and is more easily harvested. Unless very extensive areas, justifying the use of a horse drill, have to be planted, the Planet seed drill, costing about £3 10s., is the best thing to use to set the seed. Seeds of all sorts germinate more evenly when set by a drill than when dropped by hand into a row, the drill firming the soil round the seed in a way that it is very difficult to do by hand.

BANANA-MANURING EXPERIMENTS AT BUDERIM MOUNTAIN—PROGRESS REPORT.

The following report on Experiments in Manuring Bananas which have been lately proceeding at Buderim Mountain, by the Department of Agriculture and Stock, has been furnished to the Under Secretary for Agriculture by Mr. J. C. Brünnich, Agricultural Chemist, who carried out the work:—

I beg to report that, in company with Mr. Sanderson, I proceeded to Buderim Mountain in order to get a second set of photographs of the banana experiments. These photographs were taken on 11th and 12th May, 1910. They show clearly the splendid growth made since the first set of photographs was taken in January. The season has been a particularly favourable one, and even in the unmanured plots (Nos. 4 and D) the growth must be considered as fair, and clearly demonstrates what can be accomplished by deep thorough cultivation, even in exhausted lands.

The plants are suckering and fruiting well, and the record of the bunches obtained in each plot will give the final results of the tests.

Rows 1, 2, 5, 6, and 9 at Guy's, and rows A, B, F, and I at Foote's, are particularly heavy and advanced. The unmanured rows 4 and D show the smallest plants and the smallest number of suckers.

The healthy appearance of the manured plots is very apparent, and only in the poorer plots it will be noticed that the older leaves begin to turn yellow and drop off. For comparison we took a photograph of bananas, of the same age, grown at Mr. Foote's, on virgin soil, and it will be noticed that there is practically no difference between these plants and the best plants of the manured plots A, B, F, &c.

For comparison, I further took some bananas on Mr. H. Collard's plantation adjoining our experimental plot at Guy's. One row was manured with our complete mixture, applied at the rate of 5 lb. per plant, and the other with 5 lb. of Shirley's No. 5 manure. There is not much difference between the plants, and they are not any better than our experimental plots, although the land is not long under cultivation.

The green manures, particularly the pigeon pea, made good growth in both experimental plots, and I took a photograph of the crop at Mr. Foote's, also an individual plant to show the quite shallow root system, and other photographs to show the enormous development of nitrogen nodules on the roots. The pigeon pea at Guy's was weighed to go about 18 tons per acre; the crop at Foote's is even more advanced, and was flowering and seeding. The ground is covered already with a heavy mulching of leaves which have dropped off, and the plant should prove a very valuable green manure.

The Narico bean was rather patchy in both places, but yielded in a place where it had not died down 10 tons per acre. Analyses of the green manures will be made, and will be ready with the complete analysis of the soils, banana plants, and fruits for a complete report in my annual report.

The ground now under green manures will be got ready shortly for a second series of experiments to be planted in September. It is my intention to have one-half of each experimental block well limed before manures are applied, because the soil on the mountain is very deficient in lime. The manuring trials in the second block will be slightly varied from the first, which again will receive a dressing with manure similarly to the first lot applied.

The second block will be kept mulched with green manures grown on the 3rd block, and various green manures will be grown.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF JULY, 1910.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Average Test Per cent.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Honeycombe	Shorthorn ...	25 June, 1910	1,043	4·0	46·61	
Daisy ...	Holstein	29 Dec., 1909	857	3·8	36·28	
Lubra ..	Grade Jersey ...	17 Mar., 1910	662	4·8	35·81	
Lady Sue .	Grade Holstein ...	7 Apr. ,,	711	3·9	30·94	First calf
Ivy ...	Jersey	4 June ,,	674	4·3	30·11	
Cocoa ...	,, .. .	29 Apr. ,,	554	4·7	29·32	
Nita ...	Grade Guernsey ...	24 Jan. ,,	648	4·0	28·95	
Remit ...	Holstein .. .	8 July ,,	709	3·6	28·36	
Lerida ..	Ayrshire	26 Jan. ,,	632	4·0	28·24	
Gem ...	Shorthorn... ...	22 Jan. ,,	587	4·2	27·60	
Carrie ..	Jersey	26 Feb. ,,	544	4·5	27·51	
Orange ...	Grade Guernsey ..	13 Dec., 1909	540	4·5	27·31	
Linda ...	Ayrshire	29 Mar., 1910	568	4·1	26·05	
Lemonade ...	Grade Guernsey .	25 May ,,	571	3·8	24·17	First calf
Rosalie ...	Ayrshire	6 Jan. ,,	526	4·0	23·50	
Bluebell ...	Jersey	29 Jan. ,,	497	4·2	23·37	First calf
Md. Calvé ...	Grade Shorthorn	4 June ,,	559	3·7	23·00	First calf
Comet .	Holstein	14 Nov., 1909	543	3·8	22·98	
Patsie ...	Shorthorn . .	29 June, 1910	596	3·4	22·42	First calf
Dot ..	,, ...	1 Nov., 1909	500	4·0	22·35	
Dora ...	,, ...	29 Nov. ,,	477	4·1	21·88	
No. 6 ...	,, ...	19 Nov. ,,	482	4·0	21·53	
Eve ...	Jersey	1 Nov. ,,	428	4·4	21·13	
Bliss ...	,, ...	5 Oct. ,,	391	4·7	20·69	
Conceit ...	Ayrshire	17 Nov. ,,	463	4·0	20·69	
Cuckoo ...	Jersey	8 July, 1910	460	4·0	20·56	

Herd fed on 30 lb. per head per day sorghum ensilage.

"PRESERVITAS" FOR BUTTER PRESERVATION.

The following letter from Messrs. Burton, Baker, and Co., London, on the subject of a preservative for butter, made by them and sold under the name of "Preservitas," has been addressed by that firm to Messrs. Francis Forrest and Co., Melbourne. From it, it would appear that the keenest inquiry and experiments are welcomed by the makers of what seems to be a high-class preservative:—

"London, 18th June, 1910.

"We see from references in the English newspapers, and from a copy of the Commonwealth of Australia (Commerce Act) Report on the Butter Export Trade of Australia, by N. Lockyer, that the Government are exercised over a number of points with a view to improving the standardisation of Australian butter, and amongst other things they are again reopening the question of the use of preservatives. Mr. Lockyer's report goes so far as to say: 'It does not appear to have been satisfactorily settled whether the presence of boric acid as a preservative of butter is indispensable or not.'

"We assume that you will have at once taken steps to call the attention of our New South Wales friends to the matter, and possibly you may have already sent to Mr. Lockyer particulars of the experiments carried out by Mr. David Wilson in 1890, and Mr. R. Crowe in 1897. We cannot too strongly

welcome a repetition of these experiments made by the Commonwealth Government. The greater publicity they give to the results, if carried out on the right lines, the greater the benefits that accrue to boric acid and preservative manufacturers. To do this intelligently they must consult the leading butter shippers of their State, who are men of practical experience. The experiments cannot be conducted on theoretical lines, but solely on a practical basis if they are to serve as the slightest guide to the trade. The butter tested under various conditions must be of the same quality, come from the same factory, and made at the same time. It can be treated with or without salt, with or without preservative, the respective qualities being denoted by number only. It must be sent over here under exactly the same conditions that apply in the ordinary course of trade, and here subjected to the same handling conditions, which are:—After coming from the ship the butter is delivered into frozen store. It may be kept there for months before being sold. When sold it is taken out of store and may lie in the wholesale merchant's warehouse either in London or the country for some days, thence to the retailer's shop, sold over the counter after some days, and possibly kept by a private consumer for a week. If such butter reaches the consumer in a rancid or 'off' condition, or if it does not show the same keeping qualities as, say, for argument's sake, French butter treated with preservative, the public do not stop to reason, but buy the article that gives the most satisfaction, and these are the practical conditions that Mr. Lockyer and the factories under his control will do well to keep ever before them. Experiments conducted on these lines will, we are satisfied, thoroughly uphold the advantages of the use of our product, and we far prefer the same to be conducted by the Government sending to their own people on this side and followed up by them to the end. Should these experiments be carried out, and if you can give us all the particulars, by which ship they are coming, to whom they are consigned, we shall be pleased to follow up the same here, and to check that the tests are carried out under impartial conditions, engaging an expert of our own to test the results as well.

"(Signed) BURTON, BAKER, AND CO."

SPRAYING FOR REDWATER.

A correspondent has forwarded the following letter written by Mr. J. Cope, a North Coast dairy farmer, to the "North Coast Chronicle," in which he describes a remedy for redwater. We are constantly receiving letters advocating some infallible remedy, but if the writers had taken the trouble to be present at the experiments made at Yeerongpilly lately with trypan blue, and if they would read what has been written on the efficacy of this remedy, by Mr. J. C. Pound, Government Bacteriologist, on the subject, they would possibly come to the conclusion that scientific methods are more likely to be successful than their own. Mr. Cope writes:—

"I see a number of cures for redwater mentioned, but never, so far as I can remember, have I seen mentioned what I consider the most important thing—viz., to spray or wash the animal at once when it is noticed to be unwell.

"Owing to the constant wet weather, about two months ago, I neglected to spray my cattle, waiting for a fine day, with the result that one of my cows went off the milk, and a little examination showed what was the matter. We put her in the crush and sprayed her, and gave her the regulation ½-lb. Epsom salts and ½-lb. salt, but she got quickly worse and passed redwater. I thought then that she was past all cure, but as soon as I saw that the salts had acted, which was about four hours after, I gave her 30 drops tincture aconite and 30 drops tincture podophyllin to 1 pint of water (the aconite to reduce the fever and podophyllin to assist the urinary organs), and two hours afterwards I repeated this dose. I intended to repeat the dose again, but found her so

much better that it was not needed, and in about a week she was back on her milk again.

"I put down her cure mostly to the credit of spraying, as I believe the spray checks the tick poison, and a slight portion of arsenic is absorbed by the pores of the skin into the system, and acting on the debilitated state of the body assists nature to throw off the debility, while the aconite and podophyllin help the organs directly affected. I have given this treatment to three of my cows, and they are now in full health.

"A few weeks ago one of my young calves went down with the longest 'bottle tick' I have seen. We put her on a slide, brought her to the pump and sprayed her; afterwards I gave her 4 oz. of Epsom salts and 10 drops essence capsicum, as I found she had great internal pain: this gave almost instant relief. She was down altogether about three days, then gradually regained her strength, and is now as well as ever. I lost several very young calves from 'tick fever' before I started washing or spraying them. I thought the same strength I gave the cows would injure them, but I have never lost any that I have sprayed with the full tick wash. I do not claim to have found a sure cure, but as my cows recovered even after reaching the 'passing redwater stage' I think in the interests of others it is but fair they should have the opportunity of trying the same cure. One shilling's worth of each drug would do for several head, so the question of expense need not deter anyone."

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1909.						1910.						
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May.	June	July.
North.													
Bowen	1·23	0·13	0·21	0·36	3·15	19·98	15·45	7·10	21·45	5·26	0·18	2·23	0·58
Cairns	0·65	2·48	0·7	3·19	7·31	15·24	21·80	17·12	24·16	16·13	3·51	6·59	Nil
Geraldton	6·53	5·32	0·36	6·71	14·57	19·98	20·35	34·57	33·74	24·57	11·90	10·35	1·34
Gindie State Farm ...												2·65	1·45
Herberton	0·20	0·75	0·50	2·30	4·50	5·11	16·64	12·21	12·40	3·50	1·85	1·70	Nil
Hughenden .	1·37	0·33	0·8	1·95	0·54	8·01	4·52	3·59	2·96	0·30	0·41	0·85	0·48
Kamerunga State Nurs												Nil	
Mackay	4·00	0·75	0·73	2·88	3·18	25·56	35·28	9·73	24·31	6·18	3·73	5·70	1·1
Rockhampton	2·99	1·37	1·20	2·16	4·55	2·74	11·93	1·28	19·84	0·61	0·59	5·98	1·67
Townsville	0·83	0·57	0·12	2·07	1·31	11·51	23·07	10·88	17·21	2·29	0·26	1·05	0·33
South.													
Biggenden State Farm	4·01	1·78	0·29	.	2·83	6·98	7·22	3·99	3·82	0·73	1·06	5·25	0·92
Brisbane	2·10	2·44	2·74	1·56	4·14	6·45	7·24	4·19	6·12	1·22	0·43	6·74	0·39
Bundaberg	5·65	1·66	0·98	0·12	3·55	2·99	11·81	2·43	8·92	0·31	0·19	6·17	2·10
Dalby	1·19	3·13	0·47	1·92	2·13	2·45	10·88	1·33	3·87	Nil	Nil	6·06	1·42
Esk	2·74	3·31	2·60	2·61	2·69	9·20	8·60	1·94	6·09	1·19	0·27	4·74	0·58
Gatton Agric. College	2·02	2·09	2·29	1·87	.	3·92	11·79		3·66	0·69	0·61	5·05	1·99
Gympie	4·70	2·80	1·70	2·30	3·82	16·54	5·92	3·48	7·74	1·13	0·22	5·57	0·83
Ipswich	1·67	1·34	3·55	1·93	1·56	4·72	6·91	2·78	3·56	1·65	0·20	3·74	1·67
Maryborough	5·02	2·53	1·56	0·51	3.94	6·83	5·65	2·99	3·92	1·72	0·64	4·89	1·09
Roma	1·54	4·83	0·12	0·90	2·12	1·05	4·74	1·47	8·36	0·15	0·4	5·71	1·24
Roma State Farm ...	...	...	.	...	.	.	.	.	.	.	..		
Tewantin ...	4·08	4·24	1·38	3·82	1·90	8·85	5·96	3·42	15·18	6·30	1·31	15·08	0·76
Warren State Farm ...	...	...	...		...			...	...		..	1·88	..
Warwick	2·04	2·28	1·77	2·85	2·77	4·25	3·93	3·14	2·57	0·68	0·55	3·16	1·82
Wellington Point ...	...	...	...	...	...	9·00	...	...	..	...	..	.	...
Westbrook State Farm	...	...	...	...	...	.	..			.	.	2·77	
Yandina	3·70	5·81	3·84	2·30	0·76	20·18	0·71	2·07	11·81	3·26	0·40	13·13	0·70

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND, Divisional Officer.

The Horse.

THE CHIEF POINTS IN A HORSE.

As the general utility horse is the stamp most sought after in Queensland, both as being more saleable and more suitable for general purposes, we give herewith a diagram of a hackney stallion with the points numbered from 8 to 38. The points from 1 to 7 inclusive will not be noted here, as they refer more particularly to pedigree, character, style, action, colour, size, &c., which deserve treatment in a separate article. The various points we arrange for convenience under five groups. First comes the *Head*, with five points—namely,

No. 8. Ear.—Active, thin, and generous in length. The action of the ear with the eye discloses character.

No. 9. Face.—The head as a whole should be in proportion to the size of the horse. It should be broad between the eyes, clean and bony, neither with a Roman nose nor too much dished.

No. 10. Eye.—This again particularly shows character. The eye should be full, bright, mild. Too much white in the eye is generally considered to denote a roguish tendency.

No. 11. Jaws.—Wide apart, to give ample room for the windpipe. Horsemen often test this point by inserting their clenched fist between the jawbones.

No. 12. Lips.—Should be neat and compressed and not open or hanging down.

No. 13. Nostril.—Should be wide.

Forequarters, with six points.

No. 14. The Neck.—This point includes the setting on of the head, the length and shape of the neck, especially at the throttle and the junction of the neck with the shoulders. It should be long and slightly arched. What is called a ewe neck is a serious blot on conformation.

No. 15. The Breast.—This should be full and deep so as to give ample room for heart and lungs. If too broad it interferes with speed.

No. 16. The Withers.—Should be high, so as to give safe action, and should be sloping evenly into the shoulder.

No. 17. The Shoulders.—Should be strong and muscular, well laid back, and should rise with a clean and even slope towards the withers.

No. 18. The Foreribs.—These should be round (hooped), deep, and full. There must be ample room for the heart and lungs. If deficient in this respect he will lack vigour of constitution and staying power.

No. 19. Chest.—This should be deep and well developed and should run evenly into the shoulders.

The *Middle* is divided into six points—namely,

No. 20. The Back.—Should be comparatively straight and broad and should run full, wide, and level into the loin. A back slightly roached (arched) is generally indicative of strength, while the reverse is a sure sign of weakness.

No. 21. Back Ribs.—Should spring roundly in an arch from the backbone and run well back towards the hindquarters, *i.e.*, well ribbed home, and the last ribs should be round and well let down.

No. 23. The Loins.—Should be full, long, level, and broad, so as to impart the necessary strength.

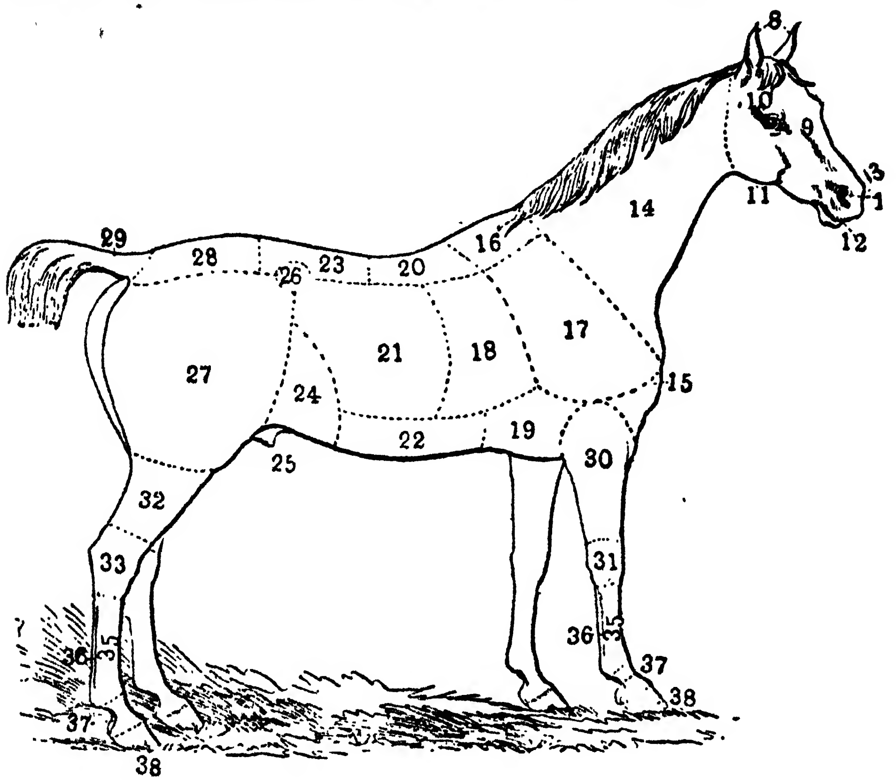
No. 24. The Flank.—Should be neat and fairly developed.

No. 25. The Sheath.—Should be well developed.

The *Hindquarters*, with four points.

No. 26. The Hips.—The hip bones should be well apart, not protruding but symmetrical.

No. 27. The Quarters.—Should be broad and strong, the stifles well apart and wide when viewed from behind, with well-turned buttocks.



No. 28. The Croup.—Should be long and comparatively level, but with a proper elevation, sloping towards the tail.

No. 29. Tail.—The tail should be well set on, with free but soft, strong tail. A strong tail is a supposed sign of character.

The *Legs*, with nine points.

No. 30. Forearm.—This should be muscular and well developed.

No. 31. The Knee.—Should be fairly large, strong.

No. 32. The Gaskin or Thigh.—Should be broad, well developed, and muscular.

No. 33. The Hock.—Should be strong and clean, with its different members clearly articulated, and nearly straight to the ground.

No. 34. The Legs.—Should be short, straight, wide set, and well formed.

No. 22. The Belly.—Should be fairly well let down, not pot-bellied nor tucked up.

No. 35. The Bone.—Should be comparatively stout but flat, broad under the knee and hock.

No. 36. The Muscle.—Should be clean, clear of the bone, well defined, and sinewy.

No. 37. The Pasterns.—Should be rather stout and short, with well-developed muscles and set straight and at proper angle.

No. 38. The Feet.—Should be fair-sized, well-shaped, not too open nor too close at the heels, giving evidence of strength and freedom from internal trouble. They should be straight, neither turned out nor turned in (pigeon-toed).

Poultry.

PREPARING FOWLS FOR SHOW.

Before washing birds of his own, a novice will do well, if possible, to get a practical lesson, otherwise he will be slow to grasp the very thorough character of the process. This thoroughness is the secret of success, and most people fail in their early efforts because too nervous or squeamish about damaging the feathers. It is little or no use just to sponge down the outside plumage. At least one large oval tub, not much short of 1 ft. deep for large fowls, must be provided, and unless there be facility for rapidly emptying and renewing the water twice, it is better to have three at once. Anyhow, plenty of hot water must be at command. Also provide a basinful of soap solution, such as washer-women use, made by cutting up some good soap into thin slices and dissolving in hot water into almost a thin melted jelly. There is also wanted a good compact sponge, rather soft and just as large as the hand can squeeze easily, and some soft dry towels.

In commencing operations the feet and legs should be washed first, and separately. Then the tub is filled about two-thirds with water about the heat of an ordinary hot bath, and the bird stood in this; it should be at least deep enough to come up about the body, and if when the fowl is pushed down it covers the back, all the better. The first thing of all is to be sure that the bird is thoroughly drenched to the skin; just dipping in does not do this. The plumage must be parted and worked about with the bare hand under the water, or the sponge, till every feather is soaked to the root. Then we begin with the soap, taking some up with the sponge, and thoroughly rubbing it into the fowl, one place at a time. It is to be a thorough good rubbing, all sorts of ways, except that we would not go straight against the lie of the feather, though we doubt if even that would do much damage. But down, and across to and fro, energetically too, with the idea always of getting down to the skin; keeping on at one part till more dirt ceases to come off. There is really no danger at this stage, and no difficulty provided the operator is not afraid to do his work, and sticks to the one point that he has got to get his bird clean. About the breast it is necessary to rub almost up and down, which is best done with the bare hand; indeed, we have seen a bird well washed with hands alone, not using a sponge at all. The fluff also requires the hand, well worked about. Some use brush to scrub, but this is not free from risk; not to the feather as a whole, but to the proper webbing afterwards; several times we have seen birds scrubbed with a brush, which did not seem to web smoothly when dry; and believe that the bristles brush out or off some of the tiny microscopic barbules which hold the web together.

One very good washer we knew used chiefly a sponge wrapped in flannel, especially for the secondaries of the wings, and the tail; the slight roughness, he said, brought the dirt off well. It is best to wash the head last, in our opinion, for the simple reason that most fowls stand quietly until the head is done. This may be done with a nail brush if preferred, in that case only working down the hackle, but you can take the head between the palms of the hands, and wash it like a ball, using nothing else.

Here ends the first stage, on which most of all depends, for if the bird is not clean now it cannot be so later on. It may be worth remarking that if a fowl has to be left for a minute to get anything, and there be no assistant, the wet sponge laid across its back, between the wings, will generally keep it quite quiet, believing it is being held. Sometimes a heavy

patient will appear faint in the hot water, or even go dark in the comb, as if about to die; in that case a good douche of cold water should at once be given, which will bring it round, and it is curious that it never, or hardly ever, faints a second time. The soap is now as far as possible sponged out in the bath (which is, however, itself very soapy by this time), and the fluid also pressed out by hand, after which the bird is placed in another bath of clean warm water, and most thoroughly rinsed. This is the second important point—to be sure the soap is all really rinsed out, in default of which the plumage clogs, and does not web nicely. This water will of course do for washing the next bird. Pressing out the slightly soapy water also with the hands, the bird is finally to be transferred to a third tub, and again rinsed, rather quickly but thoroughly, in cold water. It is then put in a warm but not hot coop, to finally dry out. The object of this is to have the final drying in a slightly moist or steamy atmosphere, somewhat confined by the lining; in such atmosphere experience shows that the plumage webs again best of all.

Rain or soft water should always be used for washing poultry, and really good mild soap, not a coarse alkaline quality. White fowls of loose plumage may be shown next day if necessary. The birds should, if possible, have at least a day to preen themselves and get the plumage in order in their own way; also, if anything is not properly done there is time to put it right. We would prefer two or three days, and they will keep perfectly clean if the pen has plenty of chaff as above advised, and the droppings are frequently removed. Another reason for a little time to spare is that often slight looseness of the bowels may follow. The reason for this, we believe, is either due to soap being swallowed or a slight chill; usually the latter, which might probably be prevented by five or six drops of essence of camphor on a bolus of meal first thing next morning, and taking care that they are not put direct from the warm drying basket into a cold pen. They should always be watched and fed carefully the following day, food in the least sloppy being especially avoided.—" Garden and Field."

HOME-MADE SOAP.

The following recipe is said to be a good one:—30 lb. of pure mutton tallow (without salt), 10 lb. of resin, and about 4½ lb. of 98 per cent. caustic soad. Powder the resin finely, then melt the tallow and while this is kept hot gradually and carefully stir in the resin, until it is melted and well mixed. Dissolve the caustic soda in about three gallons of water, making the lye to test 30 degrees Beaume. When the fat and resin are in a hot, melted condition, pour in the lye and keep the mixture stirred, and at a temperature of 180 degrees Fahr., or a little below boiling, for two hours, testing the soap from time to time on the tongue. If all taste of alkali (caustic) disappears, add more lye until the soap, when a little is cooled and applied to the tongue, gives a slight biting sensation. If the alkali is too pronounced add more tallow and stir well to ensure perfect mixing. A good newly-boiled soap should bite the tongue about as sharply as vinegar, but as it is kept and matures this to a certain extent passes away. It is important that the caustic soda be good. The use of a Beaume densometer to test the strength of the lye, and a thermometer to test the heat of the liquid are advised, because the instruments enable the maker to work on more certain lines, but are not absolutely necessary, because a little experimenting will enable the maker to gain the necessary experience; they will, however, save an amount of trouble in this respect. The object of the densometer is to obtain a standard strength of caustic soda solution, and so lessen the amount of experimental testing later on.

The Orchard.

VALUABLE CITRUS INFORMATION.

Lately two or three citrus-growers, who have only recently taken up the business of orange and lemon growing, but who are not well up in nursery work, have put several questions to us concerning budding and grafting. These questions would, as usual, have been referred to the instructor in fruit culture, but Mr. Benson's successor to that position, Mr. C. Ross, not having yet taken up the work, and the inquirers being urgent for a reply, we are glad to be able to give valuable information on budding, supplied to "The Fruit World," of Australasia, by Mr. E. L. Koethen, P.F.W. The following questions and answers will be found to satisfy our citrus-growing friends:—

BUDDING.

Do citrus trees need any special care at the time of budding?

Answer.—Yes. First, as to cultural conditions. The orchard should be in the best of tilth. What we call an extra good growing condition. The soil should be worked up nice and mellow. The plant food supply should be well looked after. It would be well to apply an extra dose of nitrogenous fertiliser, such as dried blood, or perhaps a light dressing of nitrate of soda. All these precautions will tend to induce a vigorous flow of sap—an ideal condition to ensure the bark to slip well. Secondly, it will increase the flow of sap considerably to give the tree a pruning a few days before the insertion of the buds. If it is a question of nursery trees, the lower branches should be removed; this will clear the trunk so as to provide a smooth place in which to work, and produce the desired sap flow. If you are to bud old trees, it is best to shape the tree up also. Select the limbs into which the buds are to be inserted, in such a manner that a well-formed head will be the result. They should be far enough apart to give room for the development of the new growth, and so located as to form a well-balanced head. Remove all the other limbs. This will throw the growth into the remaining wood, and ensure a free flow of sap.

Irrigation at Time of Budding.—How about irrigating at this time?

Answer.—You cannot be too careful at this time. The moisture content of the soil should be sufficient to carry the trees at least a month before the budding is done. The land should never be dry from the time the buds are inserted till they have thoroughly knitted Then, too, it is important that the trees should not be checked in their growth by the application of cold water during this setting period. We have several times seen a complete failure of buds from this cause. It is very aggravating to the budder to find that the owner of a ranch where he has undertaken a job of budding has followed up the insertion of buds with a good irrigation and driven all the sap back, and destroyed the whole setting.

How long do you leave the wrappers on?

Answer.—Until they have entirely healed in. This may take ten days, and it may take six months. We once inserted some buds in April, and the following weather was not good growing weather, so we did not bother the wraps until early in September, removed a few, and then concluded it was better to wait a while. The ones removed early all perished, while the ones left to a later date made a good stand. Then, again, on one occasion, we did some budding under unusually favourable conditions, and the tyer, being a little careless, failed to wrap a few, and on returning to the job we were surprised to find them, but even more so to find that about 90 per cent. of the unwrapped buds had knitted all right.

The Number of Buds.—How many buds should be inserted?

Answer.—In the nursery, just one to each stock. In budding over old trees, it is necessary to put in a good many more than are needed to make a new head. Allowance must be made for some failures, for accidents to the young buds, and then, too, it is well to have enough that when it comes to shaping up the new head there will be some to choose from to get the best results. It is easier to remove a few than to place more after the budding is done.

Care of Buds.—What care should the buds have after they have set?

Answer.—When assuredly set, the buds should be forced into growth. This may be done by an immediate removal of the top above the buds. The cut may be made an inch or so above the top of the scar. Sometimes with nursery stock the operator prefers to simply nick the stock a few inches above the bud, and then break the stock down along the line of the nursery row, and leave it there until the bud has made a little growth. We have found this a good practice, as it ensures a more vigorous start on the part of the buds. It requires extra care, though, especially on the part of the cultivator, not to catch the tops thus laid down, and perhaps to the injury of the buds.

For old trees we prefer to remove only a portion of the tops at first, as it is a terrible shock to the tree to decapitate it all at once. Our practice is to remove about two-thirds of the top at once; the remainder are left throughout the first winter. In order that the remaining top shall not rob the buds of their share of the sap, we remove a broad girdle of bark just above the buds—say as much as 2 in. wide. These girdled limbs will produce quite freely, the fruit of which should be picked quite early if they are to sell to any advantage, as they puff early, and grow coarse, as the season advances, but if handled discreetly they often yield quite a little income.

The remaining tops are all removed the following spring. The advantages of this method are many. It ensures protection for the first winter; it keeps up a vigorous flow of sap, so that the buds grow faster, and it is some protection against insect attacks.

PECAN NUT.

There are probably few people except nurserymen and one or two orchardists in this State who know anything about the Pecan nut-tree, yet in the United States the value of the trade in the Pecan nut has risen from 3,848,699 dollars (nearly £700,000) in 1900 to 9,563,742 dollars (£1,912,350) in 1908. This large increase is due, in some measure, to the increase in wealth and population, but still more to the fact that nuts of several kinds are recognised as foods—not mere luxuries. The Pecan nut may be described as a very delicate walnut as to flavour; indeed, it is the most delicious of all nuts. It is a native of the Southern United States, where capitalists are investing largely in Pecan orchards. The tree belongs to the hickories, and grows to an immense size, with a tall, upright, straight trunk running up to a height of from 80 to 150 ft., with a circumference of 10 to 19 ft. Such trees, of course, are veterans. Their branches spread to 110 ft. As much as 400 lb. of nuts are annually gathered from one such tree, the value being 100 dollars (£20).

In the matter of soils the Pecan is perfectly indifferent, but it has some preference for alluvial soils which hold a certain amount of ground water. But, at the same time, it will not thrive on marshy lands nor on sour waterlogged soils. To attempt planting the tree on ill-drained soils will surely result in failure. Where the permanent water lies at a depth of about 2 ft., there the Pecans are found growing naturally. It will, however, also do well

on loamy soils, light sandy, and clay soils. It seems to be more particular about its subsoil than surface soil requirements. This is owing to its enormous development of tap root. Mr. W. N. Hutt (North Carolina Department of Agriculture) says that on one or two year old seedlings the tap root is longer than the entire tree above ground.

In the United States young Pecan-trees are quoted at from 2s. 1d. to 8s. 4d. per tree, according to size, but these prices are only commensurate with the high cost and trouble of producing the trees.

There is scarcely any other kind of nursery stock that is more difficult or expensive to produce. It takes 3 or 4 years, under the most favourable nursery conditions, to produce a good grafted or budded Pecan-tree.

Pecan-trees should be set in the orchard at double the distance at which other trees should be set. Forty feet each way is the least distance at which they should be planted, and this with the idea of cutting out every other tree when they begin to crowd. This would give twenty-eight trees per acre, and only fourteen after cutting out. When planting, the tap roots must be cut back to about 2 or 2½ ft., and the lateral roots must also be shortened. Wide holes are thus not needed, but they must be deep. When the tree is planted and the soil filled in, the latter must be rammed in tightly, so as to leave no crevices or air holes.

The Pecan will not come true to seed, and seedlings ungrafted generally produce small bitter nuts. Budded and grafted trees of first-class named varieties can be counted on to begin to bear about the same time as apple-trees—that is to say, in from 5 to 6 and up to 15 years. Some will bear in 4 years, but paying results cannot be looked for under 10 years. From general observation, records of growth, &c., Mr. Hutt recommends the Mantura and Appomattox (for Virginia), and for North Carolina Stuart, Curtis, Schley, Van Deman, Mantura, and Appomattox.

The only Pecan-trees we know of in Queensland are grown by Mr. H. L. Pentecost, on the Main Range, near Toowoomba. In 1901 he had 37 Pecan-trees. At that time there were no signs of fruit, nor did he expect any for 20 years, but we believe that some of the trees have already borne fruit.

As a shade tree the Pecan has few equals, as it has a wide spreading top, very leafy, of beautiful appearance. With proper care they will, when once they begin fruiting, continue to increase in yield for 30 or 40 years, when each tree will yield from 3 to 10 bushels annually. As far as our knowledge goes, the tree, in this State, should begin to bear in 7 years.

BLACK SPOT IN CITRUS FRUITS.

A correspondent recently drew our attention to what he understood to be a perfect remedy for Black Spot in citrus fruits. We were unable to ascertain if anyone had tried the remedy, but we find an allusion to it in the "Agricultural Gazette" of New South Wales for August, to the following effect:—

"Recently claims were put forward for an alleged remedy for Black Spot of citrus fruits and other diseases—viz., the application of common washing soda to the base of the trees, just below the ground. Mr. W. J. Allen, Fruit Expert of the Department of Agriculture, and Mr. T. Harvey Johnston, Assistant Microbiologist, Bureau of Microbiology, recently visited two orchards in the Rydalmere district, where this treatment had been applied to various trees, but the officers were unable to see any improvement in the trees so treated, which were in no better condition than untreated trees.

"These results are confirmed by those of experiments made at Duval, where Black Spot in citrus fruits is being investigated, and efforts are being made to determine the most effective preventive treatment."

Tropical Industries.

SOIL WASTES IN THE CANEFIELD.

DRAINAGE WASTES.

The losses of the land through crop removals are so obvious that farmers generally have fallen into the habit of regarding them as the chief, if not only, causes of soil depletion. It is this idea, held in the minds of farmers, which leads so many, with our correspondent, to make comparisons between the losses of the soil, through the crop, and the manure supplied, and prevalent faulty practices have their root in the same idea. In actual fact, the crop is only one of the instrumentalities of waste in soils; drainage waters constantly carry into the watercourses the most precious of the elements of soil fertility ; while the absence of drainage induces even greater waste. The process of cultivation itself is an active means of inducing loss in the soils, which it is the object of cultivation to benefit. But of all the agencies, natural and artificial, by which the canefield is robbed of its resources in fertility, drainage waters are perhaps the most influential. The experiments of scientific men have in recent years done much to make clear the importance of this hitherto obscure subject to the agriculturist. It is now clearly made out that neither phosphoric acid nor potash are subject to appreciable loss through the action of drainage waters. These elements, then, when once incorporated with the soil, become a permanent part of it and are there firmly held, in combination with other minerals, subject to gradual dissolution for the benefit of all succeeding crops. In the celebrated experiments of Sir John Bennet Lawes, at Rothamstead, it was shown that the amount of phosphoric acid in drainage waters was always very small, a mean of all the analyses amounting to no more than 2·1 lb. per acre. The amount of potash was larger, but never large. Where no potash was applied as manure, the annual loss from this cause was 3·6 lb. per acre, and where potassium salts had been used, 9·5 lb. On the other hand, the loss of nitrogen, as shown in these elaborate Rothamstead experiments, while varying greatly, was, under many of the conditions of ordinary farm management, very great. Mr. Robert Warrington, F.R.S., an associate of Sir John Bennet Lawes, in the work at Rothamstead, thus summarises the results of the examination of the drainage waters of plats of ground specially prepared for this purpose :—

"The proportion of nitrates in the drainage water varies greatly at different periods of the year. The minimum proportion occurs, on an average, in March. The soil has then been washed out by the winter rains, and the temperature has not yet risen sufficiently for active nitrification to commence." This investigator shows that a variable, but on the whole rapid, increase takes place during the succeeding months, the maximum occurring in September, after which the strength of the drainage water diminishes. "The largest quantity of nitrate discharged from the soil—20 inches deep in one year—has been equivalent to 54·2 lb. of nitrogen per acre, whilst the smallest quantity has been 20·9 lb. The average quantity of nitrogen, as nitrate discharged from the soils, during thirteen years has been for the 20-inch gauge 37·3 lb., for the 40-inch gauge 32·6, and for the 60-inch gauge 35·6 lb. per acre, equivalent respectively to 239,209 and 228 lb. of ordinary sodium nitrate. This, then, is the amount annually produced in land left for many years unmanured, lying in its natural state of consolidation, and receiving no aeration from tillage."

These facts of the Rothamstead experiments are rich in suggestions for the cane-growers of North Queensland. This, it should be remembered, is

upon an English farm, with its annual rainfall of about 30 in., and climate such that during six months of every year nitrification is more or less completely suspended. What may we therefore expect in the case of the farm lands about Mackay, which receive an annual rainfall of 80 in., and where all the climatic conditions, during a large portion of every year, favour the rapid formation of the soluble nitrates? It is plain, then, that our cane soils part with their fertility and become "poor" and unprofitable to the cultivator not alone because of the crop of cane annually removed, but in good part by reason of the washings of the tropical rains to which they are so frequently subjected.

THE CHECKS UPON WASTE.

How may we reduce to the lowest this annual loss is a question of serious concern to every cane-grower. The cane plant, by reason of its perennial habit, is, fortunately for the planter, well calculated to reduce to a minimum this natural tendency to waste in soils. It, unlike the annual grain crop, occupies the ground all the year round, and frequently a given crop retains possession of the soil uninterruptedly for several years. Thus the cane rootlets, occupying almost every square inch of the soil, are constantly ready to seize upon every particle of nitrate as soon as it has been prepared, and long before the drainage waters are able to carry it beyond their reach. The planter, then, can do no better than to see that his land is constantly occupied, but particularly during the rainy season, by a crop of cane, or some other crop subsidiary to it. The bare fallows, which so often succeed the ploughing out of the old stools of cane, ought generally to give place to a crop of the cow-pea, or some other like nitrogen gathering plant. Again, the fallowing, and such other like cultivation as may be necessary in order to clear the ground of weed growths, had better be done during the dry season, because weeds are dealt with most efficiently then, and because there is the least danger of loss of fertility through the agency of drainage waters.

NEEDS OF CANE SOILS.

The needs of cane soils, in respect to manures and restorative treatment, most likely are not greatly different from the requirements of soils devoted to other crops than sugar-cane. I confess to having very little confidence in the various formulæ of manures for particular crops, put forth without reference to the condition of the soil and other circumstances. Every crop has its own constitutional wants, as much in respect to food as to climate, perhaps. But when we undertake to meet the feeding requirements of crops we have to supply soil deficiencies as well, so that a knowledge of the condition of the soil is a first consideration in manuring. I have already shown that the planter who farms his land aright is led by experience to understand its needs and the best means of supplying them. Let us now examine the case of the cultivator whose soil has slipped away from him through faulty management, but whose means of restoration are limited to the market fertilisers. To those without practical experience of commercial manures few farm problems appear simpler than the application of manures to soils whose needs are known. The practical man is likely to exclaim—"If the soil stands in need of potash or phosphoric acid or nitrogen, why not apply this element and have done with it?" There are several difficulties that oppose this simple programme. In the first place, experience has shown that the full benefits of the application of some needed element, say potash, are only experienced when the other manurial elements, nitrogen and phosphoric acid, are present in the soil in abundance. This fact, for such it is, explains why so many failures with manures—when used alone—like kainit and superphosphate have been reported from the Northern districts of Queensland. The conclusions reached after five years of experiments with fertilisers applied to cane at the Louisiana Experiment Station are thus stated

in a bulletin of the station :—"It will be seen from the above table that while nitrogenous manures (alone) and mixed minerals (alone) have each greatly increased, the tonnage over unmanured (the latter more so than the former), a combination of the two has given, generally, further increased results, and with frequently an increased sucrose and purity." There is a wonderful difference, too, in the capacity of soils for manures. Some soils, as I have already pointed out, are not only poor but incapable of fertility. They seem wanting in the ability to digest and absorb any restorative application that may be incorporated with them. To make abundant applications of expensive fertilisers to such incapable soils is a wasteful folly which makes the old-fashioned scourging system seem respectable. The first duty of the owner of such soils is to make a careful calculation, based on the cost of manures and labour and the value of cane, in order to understand whether such lands are really worth improving. He may then, perhaps, ask himself the question raised by Storer whether, under the circumstances, it might not be better policy to buy an additional new field rather than to spend money in improving the old one. Most likely the real wants of such soils—soils found in every agricultural district in Queensland—will be met by means calculated to restore them to physical health, like thorough draining, persistent, deep tillage and, in some cases, irrigation. Manures rarely give good results under conditions of soil and climate that are inimical to the general health of plants. I have had in charge a good many experiments with fertilisers applied to crops other than cane, and have observed that in times of drought and in seasons of prolonged low temperatures, or when the land was insufficiently worked, the manured plats were scarcely distinguishable from the unmanured, in the common failure. Every year thousands of tons of useful fertilisers are wastefully applied to soils which need instead better cultivation and under drainage with, perhaps, a change of crops for a few years.

Again, the sugar-grower has, in the nature of his crop, peculiar difficulties to contend with in his efforts to increase the capacity of his land. It is easily possible to increase the tonnage per acre of cane, but, as a recent experimenter in this field observes—"A large tonnage means nearly always a long period of growth to the cane. A long period of growth in Queensland means immaturity; and immaturity is antagonistic to high sugar content. A high sucrage with low tonnage, or high tonnage with low sucrage, appears now as the horns of the sugar-planter's dilemma." There is, I believe, at the present time no known means by which sugar, the real object of all the planter's labours, can be increased in his crop of cane. He may, if he chooses, obtain a greatly increased *tonnage* of cane by the use of nitrogenous fertilisers, or by ploughing under some nitrogen-bearing crop like cow-peas, but the low sugar content of the crop and difficulties in milling it will quite likely offset the increased yield. With a fertiliser rich in phosphoric acid he will obtain a crop that matures early, and which, if there is not too much nitrogen in the soil, is of good quality. The farmers in Southern Queensland will find in the bonedust and the various "meatworks manures," so abundant in the markets, a useful means of hastening the crop out of the reach of impending frosts. The precise effects of potash upon the crop are not so easily stated, although its benefits are often immediate and direct. It should in most cases be applied with phosphatic or nitrogenous fertilisers, one or both, and it is especially useful to cane-growers in stimulating to large growth a crop of cow-peas grown to plough in land designed for cane-planting. Between the nitrogen on the one hand and the potash and the phosphates on the other, there is this important difference: so far as their behaviour in the soil is concerned, the nitrogen is constantly escaping from the soil, chiefly through the agency of drainage waters, while the potash and phosphates become fixed in the land, forming a more or less permanent addition to the natural stores of plant food. This fact is of the utmost vital

importance to the user of manures. If he applies his soluble nitrates too far in advance of the crop they are designed to benefit, it is more than probable that the fertiliser will have been carried deep into the subsoil, beyond the reach of the growing crop, or through drainage channels into the neighbouring watercourses, before the crop has been able to seize upon them. Or, again, if the nitrogen be given in large quantity, and at one time, the loss, for obvious reasons, will be heavy. This want of permanence in nitrogen placed in the soil suggests criticism of the common practice of turning manures rich in nitrogen beneath a deep furrow slice. The bottom of the furrow is a step in the direction of those deep levels ultimately reached by much of the nitrogen, but which the roots of plants do not penetrate. The cane-grower will, in the vast majority of cases, require manures rich in all three elements, although their relative proportion will be influenced by apparent soil needs. For soils considerably reduced by cropping, the following formula would often prove useful:—

(1.) 200 lb. dried blood, or
100 lb. sulphate of ammonia, with
500 lb. meatworks manure, and
100 lb. sulphate of potash.

For land of good quality naturally, in moderate fertility, and where the object was to maintain its condition without excessive stimulation, this compound should be satisfactory—

(2.) 5 tons stable manure,
350 lb. bonedust,
100lb. sulphate of potash.

If the stable manure is made from animals fed on rich grains, the above amount might be reduced by one-fourth, but, on the other hand, double the amount abovenamed of the voidings of grassfed stock would be none too much. Upon light and sandy soil it is imperative that the stable manure be well rotted before applying. For lands much reduced in condition and foul with weed seeds, I feel safe in commending the following treatment:—Plough the land during the dry winter months, and lightly harrow in—

(3.) 200 lb. sulphate of potash, or
700 lb. kainit, with
500 lb. meatworks manure, or
400 lb. bonedust.

Put the ground in suitable tilth for planting, by ploughing and harrowing cow-peas, say, in September, according to season. The variety known as "clay-coloured" is one of the best for this purpose. Sow one bushel of these per acre, and do not disturb the crop until it has become necessary to put the land in tilth suitable for cane. Most likely it will be found necessary to turn the cow-peas under about two months prior to the time of cane-planting. In cultivating the first ratoon of this crop, if the crop still shows weakness in the soil, use per acre—

(4.) 200 lb. dried blood, and
500 lb. meatworks manure, and
100 lb. sulphate of potash.

Afterwards proceed with the ground according to circumstances, although it will most likely require about the treatment advised in the case of land in moderate fertility (formula No. 2).

I conclude this branch of my subject with sundry recommendations concerning the use of fertilisers in the canefield, which I am sure will repay heeding—

1. The annual dressing of manure will give by far the best results when applied in two doses—one early in the season the other four months later. In light sandy soil this is imperative.

2. Manures should not be placed deeply in the ground. Probably 3 in. is sufficiently deep, whatever the crop may be.

3. Manuring without thorough tillage and all that is embraced by the phrase "good farming" is a really unprofitable and, in a sense, wasteful process. This fact explains a goodly number of the failures reported in the use of fertilisers in the State.

THE DATE PALM FOR WESTERN QUEENSLAND.

More than probably there is no tree which would be more profitable than the date palm, if planted on the plains of Western Queensland. Around Barcaldine and Longreach in the Central-west, and between Cunnamulla and Thargomindah in the South-west, there are tens of thousands of acres where the date palm would luxuriate and bear very heavy crops. We have seen in these parts of Queensland date trees 7 years old bearing heavy crops of as fine dates as any which we import. At Barcaldine, in 1903, half a dozen date palms in Dr. Cook's garden each had from four to six large clusters of ripening dates, and it was calculated that each palm would yield from 150 to 200 lb. of fruit, At this rate, a single acre of 108 date palms should produce dates worth £125. In the same district, some date trees at Mr. Cronin's farm were also in full bearing. It would be interesting to know how much those palms are bearing to-day, when they are about 14 or 15 years old. The amount of rainfall requisite for the best dates is from 5 to 10 in.; for those of inferior qualities, from 10 to 25 in. The mean temperature required is about 76 degrees Fahr., and this temperature, often rising to 100 or 120 degrees, is found on these Central plains. Although the date requires a hot, dry climate, yet its roots must have access to moisture, and thus, although it is essentially a tree belonging to desert regions, yet in the Sahara Desert, in Africa, it is confined to the oases in those deserts where water is found. It, therefore, flourishes in rainless countries, but only where there is moisture in the soil, either natural or produced by irrigation.

There is a good reason why the tree flourishes in Western Queensland. There are probably 1,000 bores in the West, nearly all pouring forth hundreds of thousands of gallons of water suitable for irrigation. Connected with these bores are many miles of bore drains constantly flowing. It is principally along the line of these drains that the date palm should be planted. But the water percolating through the soil laterally provides ample subterranean water for the trees at long distances from the main drains.

The best soil for dates is a sandy, granitic, schistic, or calcareous soil. The palms will even thrive in saltish soil, and the water for their irrigation may be slightly brackish without detriment to them. The artesian water of the Oued Rir district in Algeria contains from 0·57 oz. to 1·07 oz. of dry salt in a gallon.

The best trees are propagated from suckers from 3 to 4 years old, having an average weight of 6 lb. Those raised from seed are much slower in maturing, and are generally poor. When the sucker is first planted, it must be watered daily for six weeks, after which they need only be watered once a week in summer and once a month in winter.

The nut or stone or seed, as it is called, does not germinate under from 6 to 12 months, and then the plant grows very slowly for the first 2 years. The trees yield fruit in from 5 to 6 years, and are full bearing at from 20 to 25 years, after which they continue fruitful for 150 years. Several bunches of flowers are formed in a season, each often producing 200 dates. Select trees are reported as having borne a crop worth £2, but the average may be set down at 4s. per tree. Where the trees are planted, as in Algeria, in the proportion of 500 to an acre, even at 4s. per tree, the value of the fruit amounts to £100.

FECUNDATION.

From our experience in Queensland, artificial fecundation does not appear to be necessary, but in Algeria and all over the East, probably owing to the paucity of insect life, fecundation is practised extensively. The method adopted is to open the male spathes when they crackle under the finger; the cluster of pollinised flowers is extracted, and divided into portions containing seven or eight blooms. The workman climbs to the summit of the female tree, opens the flower spathe, and slips in one of the male fragments, interlacing them with the female cluster, thus making fecundation certain. In Queensland this labour is rendered unnecessary since the bees and other insects perform the work, in the same manner as they fecundate the melons and pumpkins.

There are more than a hundred varieties of dates, each peculiar to a district. The Gomera (in Northern Arabia) dates are large and contain no seed. The Zadie produces the heaviest crop, averaging in full bearing trees 300 lb. to the tree. The Deglet Nour is considered the best for keeping.

TREATMENT OF THE FRUITS.

Four or five months after fecundation the dates begin to swell, and when they have attained nearly their full size, they are tied to the base of the leaves to prevent them from being beaten and bruised by the wind. For preserving they are gathered a little before they are ripe. Ripe dates cannot be kept any length of time, or conveyed to any distance without fermenting and becoming acid, therefore those intended for export are picked just before ripening and are dried in the sun on mats. No more than twelve bunches are allowed to ripen on each tree.

The hotter and drier the climate the richer is the date, and those grown near the coast are only fit for feeding stock.

TEMPERATURE.

Now let us compare the climates of Hughenden, Longreach, and Charleville with that of Biskra, in Northern Africa, at, say, an altitude of 410 ft. above sea level—

	Queensland.	Biskra.
Annual average temperature	67·74	68·5
Mean temperature, coldest month ...	48·61	50·2
Mean temperature, hottest month ...	84·90	89·8

We cannot give the extreme minimum temperature of Biskra, but the lowest in the part of Queensland referred to is 26·4 at Boulia in July. As the date palm can safely stand as low a temperature as 26 degrees. Fahr., it would be safe even at Boulia from being killed by frost.

RAINFALL.

In the above possible date-growing belt of Queensland, the rainfall ranges from 5 to 24 in., and in the still more westerly portion this reaches the minor limit, therefore improving the quality of the date on account of the greater dryness of the air, combined with the circumstance that there is greater heat also.

ALTITUDE.

In Western Queensland the rivers and creeks all run towards the south-west, showing that the higher ground is to the north and east. Then there are high downs, between the Gulf of Carpentaria waters and the Diamantina and Thomson Rivers, so that all this higher ground must vary from 600 to 1,400 ft. above sea-level. But, to the south-west of Boulia and Windorah and to the south of Thargomindah and Charleville, the altitude of the country is from sea-level to 600 ft. above it. From these figures, it may easily be seen where there is least likelihood of frost.

SOIL.

The soil of the regions enumerated is of the geological formation known as mesozoic, with desert sandstone on the higher ground between the various watersheds, and lower cretaceous on the plains and downs. As, apparently, the date palm prefers a sandy soil, the conditions in this case seem favourable also. From the above data it will be seen that Western Queensland is generally suited to the cultivation of the best dates. As to the local conditions, they must be ascertained by Queenslanders themselves; the object of this paper is to give to the State the information with regard to the date which is scattered throughout many books, and is not easily obtained, and also to suggest the best place for initiating experiments in date cultivation in this country.

We already know, as before stated, that the date palm thrives and fruits heavily in the Barcaldine district. But excellent fruit has been brought to the Department of Agriculture by growers nearer the coast, as, for instance, by Mr. Pentecost, at Helidon, and by another grower right on the coast at Sandgate.

NOTES ON CEARA RUBBER.

The extraordinary interest which has of late been taken by all and sundry in the rubber industry in Great Britain has quickly extended to Australia, and almost daily there are inquiries at the Department of Agriculture and Stock, anxious to obtain information as to the relative values as rubber producers of the several rubber producing plants. Many are desirous of advice as to planting Ceara rubber, more especially that known as *Manihot Glaziovii*; the yield of latex from this plant, some say, only lasts for three years, whilst, according to others, the life of the tree is only ten years.

The latest information on this class of rubber is given in a letter to the "Rubber World," by Mr. J. S. Low, who is practially experienced in its cultivation and production. He says:—

From practical experience with *Manihot Glaziovii* trees in German East Africa, where it is known that the plantations are the largest and best in East Africa, this being proved by the great number of planters from British East Africa visiting German territory to see and learn how the trees are planted and treated, I am able to state that in East Africa and elsewhere the trees are indestructible within, of course, all reasonable limits, assuming, that is, moderate and careful tapping, the keeping of the bark of the trees clean, &c.

On experimental tappings of trees ranging from 2 to 3 years and of girths from 11 to 18 inches, the following results were obtained from first tappings:—

2 trees of	2½ years,	12 and 13 in. girth,	gave	4	grams	wet rubber
1	,,	14 in.	,,	12	,,	,,
2	,,	15 and 17 in.	,,	24	,,	,,
3	,,	11, 15, 18 in.	,,	31	,,	,,
				71*	,,	,,

or an average of nearly 9 grams per tree wet rubber.

The first tapping of ninety-one larger trees of 2½ to 3 years old gave 3 lb. wet rubber, or nearly ½ oz. per tree. In another instance seventy-five trees, also from first tapping gave 2 lb. ½oz., or somewhat under ½ oz. per tree wet rubber, and this in a district where the rainfall is only 56 in. in the year, and where in the dry season most of the leaves were off the trees.

These trees can be tapped at the very least two or three times per week without in any way injuring them, so long as reasonable care is taken, and they are known to give more latex at the second and subsequent tappings. In a district where the rainfall is greater, nearly double the amount of latex

* 28 grams to 1 oz.

would be obtained. From these dry-weather experiments it will be seen that the lowest possible average from one well-grown tree just ready for tapping is fully 10 grams wet rubber per tree, and at the lowest rate of tapping—*i.e.*, twice a week—this works out at 1,040 grams, or about 37 oz. of wet rubber per tree per annum, which, after deducting 30 per cent. for moisture, leaves 26 oz. of dry rubber per tree.

In the old plantations a great number of the trees are from 9 to 13 years old and still producing latex in large quantities. Ceara trees (*Manihot Glaziovii* and *M. dichotoma*) yield for their size and age far more latex in proportion than the Pará (Hevea) trees. As an example of the wonderful hardiness of these, it may be mentioned that trees are to be met with that have been damaged by being broken off from the ravages of white ants and other causes to within 2 or 3 ft. of the ground, putting out a new shoot from the side of the stump and forming an entirely new tree. In cases of this sort, of course, the actual roots have not been damaged.

Ceara rubber or Manicoba, known as *Manihot Glaziovii*, belongs to the Spurge order, and is a very close relation to the Cassava plant from which tapioca is made, and thrives best in deep loamy soil.

These notes are given with a view of contradicting reports that have been spread to the effect that the life and hardiness were not all that could be desired.

In a Brazilian report I read: "*Manihot Glaziovii* produces a rubber more pure even than that of Pará. There are plantations in the State of Bahia where 676 trees per acre are dealt with and return 1,490 lb. of rubber per annum." This is, of course, in their native soil and climate and where the country is at times flooded for months at a time. Instead of injuring the trees, the floods add considerably to their growth and yield of latex.

TAPPING CEARA RUBBER IN MYSORE.

(From the "Planters' Chronicle," Vol. V., No. 7, March, 1910.)

ALTITUDE OF PLANTATION.—About 3,300 ft.

AVERAGE RAINFALL.—90 to 100 in.; chiefly from June to October; occasional showers in April and May, but frequently no rain from 1st October until April following.

EXAMPLE I.—Ten of the best grown trees in a 5-acre clearing, $3\frac{1}{2}$ years old and averaging a girth of 13 in. 3 ft. from the ground, were tapped on alternate days during October and December, 1909, and February, 1910—*i.e.*, 440 tappings. The aggregate yield of latex was 6,372·25 c.c. (1,795 drachms) which resulted in $4\frac{1}{2}$ lb. dry rubber.

This is equivalent to 90 lb. dry rubber per acre of 200 trees for six months, or 180 lb. per annum, tapping on alternate days and alternate months.

NOTE.—Of the above one tree proved a poor milker, giving slightly less than half the quantity of latex of the other nine.

EXAMPLE II.—Five trees in a 5-year-old clearing, averaging a girth of 17 in., tapped as above, yielded 7,188·75 c.c. (2,025 drachms) latex, which gave 5 lb. dry rubber. Equivalent to 200 lb. dry rubber for the six months, or 400 lb. per annum per acre.

EXAMPLE III.—Five trees, 7 years old, girth 26 in., tapped as above, yielded an aggregate of 12,709·00 c.c. (3,580 drachms), giving 9 lb. of dry rubber. Equivalent to 720 lb. of dry rubber per acre per annum.

EXAMPLE IV.—Two trees, 10 years old, with girths of 32 in., gave respectively 900 and 855 drachms of latex, tapped as above, which gave $2\frac{1}{4}$ lb. and $2\frac{1}{8}$ lb. dry rubber. Equivalent to 875 lb. dry rubber per acre per annum.

Example V.—One 15 years old tree, having a girth of 43 in., tapped as above, yielded 1,575 drachms latex, giving 4 lb. dry rubber. Equivalent to 1,600 lb. dry rubber per acre per annum.

The trees appear to have suffered no harm whatever; I intend to tap them again in April, while bare of leaf, and again in June and August, during the south-west monsoon, and shall be curious to see how the yields compare with those already obtained.

With the cheap and skilful labour in Mysore, it should be possible to place Ceara rubber on the market at considerably less than can be done from the Straits or Ceylon; however, even taking the cost of cultivation, tapping, &c., at 1s. and rubber at 4s. per lb., Example II. points to a net profit of over £50 an acre at 5 years old. (£100 with rubber at its present price.) I hope some of your readers in Coorg, where I believe Ceara has been extensively planted of late, will forward some of their results; in any case I am perfectly satisfied in my own mind that Ceara, if taken up seriously, can and will do for Mysore what Para has done for the Straits Settlements.

THE MANUFACTURE OF SYNTHETIC RUBBER.

It is well that intending rubber planters in Queensland should be in possession of all information affecting the present and possible future position of the rubber industry, in order that they may avoid mistakes involving loss of time and capital, and it is with this view that we at present devote a considerable portion of our limited space to a consideration of all that may be of benefit to them. Much interest attaches to the question of the manufacture of synthetic rubber, a question which is being earnestly discussed in all journals published not only in tropical countries, but also everywhere in manufacturing centres. It would not be wise, in these days of chemical research, to assert that a perfect substitute for rubber will never be produced. This was once said of synthetic camphor and indigo, yet time and the unremitting experimentation by scientific men have resulted in the seemingly impossible having been successfully accomplished, and if commercially successful in the case of these products, why not with rubber?

The following article in the "Indian Trade Journal" goes to show apparently that the impossible has been achieved. Mr. C. R. Hennings, F.C.S., published the article in the "Financial Review of Reviews," and it has now appeared in the Indian and many other journals:—

When, a few months ago, a company which had been formed for the purpose of making synthetic rubber went into liquidation, it was generally thought that for some time to come nothing more will be heard of the possibilities of making artificial rubber. As will be shown in this article, such is far from being the case.

That modern science—and in particular that most up-to-date of all sciences, applied chemistry—is fully aware of the trend of things is shown by the great amount of attention that was paid to the cultivation of rubber and the possibilities of the manufacture of synthetic rubber, at the British Association meeting held at York in August, 1906, when, in the Chemistry Section, numerous papers were read on the subject, and the successful production of—not a substitute, but—artificial rubber equal in all respects to the natural article was regarded as a question certain of solution within a year or two. Professor Dunstan, Director of the Imperial Institute, one of the world's authorities on tropical products, stated that in principle the chemical production of rubber, with isoprene as its base, was assured, and all that remained was to decide on the manner of the synthetic process, and to cheapen the cost of manufacture in order to bring the latter into the realm of practical economics, the cost of production of the natural substance being at that time about 1s. per lb. At the same congress a paper was read by Professor Tilden,

who spoke regarding certain qualities of isoprene—this base of the future synthetic rubber; and Professor Crossley read a paper contributed by a German scientist, Professor Harries, on the composition of rubber. It is this Professor Harries who is associated with the discovery of the artificial rubber, the manufacture of which is now being taken up by some of the great German chemical concerns.

With the object lessons of artificial indigo, artificial camphor, and the production of nitrates from the air before us, it is unnecessary to dilate upon the scientific ability of the commercial acumen of the German chemical industry. In Germany science and industry work hand in hand; and, as soon as an opening for a synthetic product appears likely, trained chemists, with every aid that modern science can provide, work undisturbed for years may be, with the sole object of resolving the problem set before them. In this manner Professor Harries has devoted years to research work in rubber synthesis and in the "Chemiker Zeitung"—beyond a doubt the world's leading chemical journal—he has stated that artificial rubber is now a fact. It has long been known that in heating rubber one of the products of distillation is isoprene, from which it was presumed that this substance could serve as the base on which synthetic rubber could be built. It was ascertained that 2 lb. of good quality rubber yielded about 2 oz. of isoprene. The first experiments in this direction were made by Professor A. Tilden, an English scientist, so long ago as 1882. He stated that he had obtained rubber-like substance when saturating isoprene with hydrochloric acid. Later, he discovered that isoprene, when left standing for some time, polymerised and formed substances which, in his view, represented rubber. Isoprene itself was derived from turpentine oil passed through hot tubes. Professor Harries endeavoured to verify these results, but failed to obtain them, and came to the conclusion that, if Tilden obtained rubber in the manner described, he must have met with quite accidental conditions. The fact that rubber had actually been produced by this means had not been proved by Tilden. Products, in many respects similar to rubber, might still be far removed from rubber itself. Quite recently, however, one of the great German aniline dye concerns, employing some 7,000 workpeople, and having a paid-up share and debenture capital of over £2,500,000, submitted to Professor Harries samples of rubber which they had manufactured by a secret process, with the request that he would test them in every way. He applied the most stringent tests, and established beyond a doubt that these samples were in every way identical with natural rubber. Other processes, according to existing patents, having proved futile, Professor Harries states that for the first time artificial rubber has been produced. Continuing his experiments and starting from isoprene as a base, finding that natural rubber dissolves when heated with glacial acetic acid, he treated isoprene, and, observing certain conditions with the same substance, ascertained that rubber could be produced in this way. The artificial rubber is as elastic as the natural product, and is of a brownish white colour.

It appears, therefore, to be an established fact that the problem of manufacturing synthetic rubber has been solved. It is one thing to solve the scientific problem and another to manufacture on a commercial basis, but, seeing that an influential company, which, allied with two other concerns, is a powerful factor in the world's colour industry, is interested in this matter, all the conditions to a commercial success—viz., science, capital, and experience—are present, and the speculator in rubber shares may well ask himself if the time has not come to consider whether there are factors other than those making for a continual rise in the price of rubber. Certainly the higher the price of the natural product, the more likely is the successful commercial exploitation of synthetic rubber. What may not have been practicable with a price of 2s. per lb. may be profitable at 4s., not to speak of 10s. or more, and the possibility of steadily reducing the cost of production of a chemically manufactured article is, of course, much greater than that of reducing working costs on tropical plantations.

Of course it is not intended to imply that the death-knell of natural rubber has been sounded, and some time will necessarily elapse before the artificial product is likely to flood the world's markets. But the death of the natural indigo industry, as the result of the invention of a German professor, is an example it is well to keep in mind. Once a flourishing native industry in India, the production of natural indigo is absolutely decaying, the synthetic preparation having captured about four-fifths of the world's market. Camphor is another instance. A few years ago a German chemical concern placed on the market a synthetic product, identical for all chemical purposes with the natural product in which Japan had enjoyed practically the monopoly, and while here the artificial product has not driven the natural one right out of the market it has most effectually kept down the price, this being perhaps the lesson that had best be impressed on those who constitute the driving force in the rubber market. Artificial rubber, differing in no respects from the natural product, is now, according to the responsible statements of one of the leading German scientists in the most authoritative chemical journal, an accomplished fact, and in the hands of one of Germany's giant chemical concerns. German science has once again scored heavily, and has again shown how science and industry working together can secure for the thickly populated centres of the old world industries tending to lessen that dependence of our vast populations on new countries for the raw materials of industry, which, in the minds of some observers, constitute a menace to our well-being in the future.

RUBBER: WIDE V. CLOSE PLANTING.

900 LB. PER ACRE FROM A CLOSE-PLANTED SWAMP!

It is perhaps a platitude, but it is a platitude that is well worth "rubbing in," to say that even the most "experienced" planters know very little indeed about the history of the Pará rubber tree, or *Hevea brasiliensis*. We are, in fact, only just beginning to learn something of the effects that varied conditions have upon this tree, how it behaves in certain circumstances, and the response that it makes to different kinds of treatment. And the reports received from one quarter are often in direct contradiction with those received from another equally trustworthy source. With regard to practically every feature of the cultivation of rubber expert opinions differ, and the more experienced the planter the readier he is as a rule to confess that, like his fellows, he is working very largely in the dark. Take, for instance, the question of wide *versus* close planting. For several years, basing our arguments on the fact that the *Hevea brasiliensis* in its own country is a forest tree that sometimes attains a very large size indeed, and knowing, because we have seen it, that trees planted a good distance apart do show greater girth—and therefore more tappable area—than those planted closely, we have advocated wide planting. And because it seemed natural to allow a tree, like an individual or an animal, to develop and grow before calling upon it to submit to processes which in themselves are unnatural, we have advocated late tapping. And now we hear of trees, that were planted very wide apart and allowed to attain their full growth before being tapped, which have yielded practically no latex at all: while others planted close together and tapped for all they were worth have in successive years given phenomenal yields. There is a well-known block of a few acres on Caledonia Estate, marching with the railway line and quite near the station. The trees here were planted some time ago, more with the idea of filling in an unsightly swampy piece of ground than for profit, and the distance apart at which they were placed was, roughly, 10 by 10. For several years this block was pointed out by passengers in passing trains as an "awful example" of the effects of close planting. The trees were certainly not much to look at, being abnormally tall, weedy in appearance, and of very slight girth. Moreover, they are subjected to all kinds of experiments in the way of

pruning, lopping, and tapping, besides which the soil is by no means ideal rubber—always according to the experts. And yet that block yielded last year at the rate of 900 lb. of dry rubber per acre! Such results as these, which, though opposed to all presumption and experience, are by no means isolated, must cause managers to revise their views with regard to some of the most essential features of rubber cultivation.—"Penang Gazette."

SUGAR YIELDS IN HAWAII.

The Director of the Hawaiian Sugar Experiment Station, Dr. C. F. Eckart, has supplied the following information concerning the sugar yield per acre to "Tropical Life." Some differences of opinion, it seems, were held as to whether the Hawaiian yields are reported on the hectare (2·47 acres) or acre basis. He writes:—

For your information I would state that Hawaiian yields are always calculated on the acre basis, the weight of cane or sugar being given as so many short tons (2,000 lb. to a ton). The average yield of sugar per acre in Hawaii for the crop of 1909 was 10,060 lb., or 5·03 short tons. The average yield of sugar per acre on the irrigated estates was 6·48 short tons; and on the unirrigated estates 3·48 short tons.

The maximum yield of sugar on a plantation scale is practically 11 short tons per acre; on a few hundred acres the maximum has reached 15 short tons.

The Hawaiian crop occupies the ground from 18 to 22 months, and this should always be taken into consideration in comparing the yields of Hawaii with those of other countries.

In case my statement "that Hawaiian yields are always calculated on the acre basis," &c., might be taken to mean that the 80 tons of canes per hectare as given for Hawaii in your table (quoted from your May, 1909, issue), should be altered so as to be 80 tons of canes per acre, or 197·6 tons per hectare. I mean to imply in the above that all reports of yields emanating from Hawaii are concerned with the short ton (2,000 lb.) and the acre basis.

Below are given the average yields of cane and sugar expressed in short tons per acre, and also in metric tons per hectare, for the crop of 1909:—

YIELDS OF CANE AND SUGAR IN THE HAWAIIAN ISLANDS FOR 1909.

	Short Tons per Acre		Metric Tons per Hectare	
	Canes.	Sugar.	Canes.	Sugar.
Average of Hawaiian Islands ...	38·58	5·03	86·52	11·28
Average of irrigated estates	49·70	6·48	111·45	14·53
Average of unirrigated estates .	26·69	3·48	59·83	7·80

I trust that this will make everything clear in regard to Hawaiian yields of cane and sugar.

METHOD OF ESTIMATING COTTON CROPS.

Mr. J. C. Crawford, special agent attached to the United States Bureau of Entomology, has elaborated (says the "Natal Agricultural Journal" for July), the following directions for estimating the yield of cotton from plants in the field—hints which will doubtless be found useful to those of our readers who are engaged in cotton cultivation.

Determine the average number of sound bolls per plant, Mr. Crawford says, by counting the number of such bolls on some five adjacent plants in at least three separate places in the field, and dividing the total number of bolls counted in this manner by the total number of plants examined. Where the field is very large or contains different soils, more than three places should be selected for counting. In the first column of the following table find the distance between the plants in the field, the crop of which is to be estimated. Then refer to the number on the same line in the following column, headed by the size of bolls to which the variety planted belongs. Dividing the average

number of bolls per plant in the field by the number found in this manner in the table will give the fraction of a bale per acre that will be produced. In using this table, due allowance must be made for a poor stand.

Table showing number of Cotton Bolls per plant of various classes required at certain Distances to produce a Bale per Acre when Cotton gives 33⅓ per cent. of lint:—

Distance between Plants in Feet	Number of Plants per Acre.	Large Bolls, 50 to 65 per Lb	Medium-sized Boll, 70 to 89 per Lb.	Small Bolls, 80 to 100 per Lb
1 × 3	14,520	5·9	7·7	9·5
1 × 4	10,890	7·9	10·3	12·7
1 × 5	8,712	9·8	12·9	15·9
1 × 6	7,260	11·8	15·4	19·1
1½ × 3	9,680	8·9	11·6	14·0
1½ × 4	7,260	11·8	15·4	19·1
1½ × 5	5,808	14·8	19·3	23·8
1½ × 6	4,840	17·8	23·2	28·6
2 × 2	10,890	7·9	10·3	12·7
2 × 3	7,260	11·8	15·4	19·1
2 × 4	5,445	15·8	20·6	25·4
2 × 5	4,346	19·7	25·8	31·8
2 × 6	3,630	23·2	30·9	38·4
3 × 3	4,840	17·8	23·2	28·6

Example.—If, in the case of a small-boll variety like the King, the average number of bolls per plant is found to be 10, and the plants are put in at a distance of 2 ft. in rows, 4 ft. apart, the amount of the prospective yield per acre will be 10 divided by 25·4 or 0·39 of a bale.

NEGLECTED INDUSTRIES.

KAPOK.

Australia uses annually from 10,000 to 12,000 bales of kapok, but this is only an approximate estimate, as reliable returns are not at present available. Kapok comes principally from Java; but, in so far as the adaptability of the soil and climate to the cultivation of the tree is concerned, there is no reason why Queensland should be dependent upon a foreign country for its supplies. The plant thrives everywhere in tropical Queensland and bears heavy crops. In British New Guinea, there are hundreds of fine kapok trees, notably at Rigo, a few miles distant from Port Moresby, where there are avenues of these singular, skeleton-like trees, bearing plentiful pods, which, when ripe, burst, and the valuable silky contents are scattered far and wide by the winds. Why this crop should be neglected in such a country as Papua, where native labour is plentiful and wages low, is not to be understood unless on the supposition that rubber, cocoanuts, and sisal hemp absorb all the energies of the planters. The following account of the cultivation and preparation of the crop in Java is given in the "Mindanao Herald," Philippines:—

Soil and Climate.

Kapok comes principally from Java, and the Javanese product is generally considered as the standard. In business, kapok is understood to be the cotton around the seed of the kapok tree (*Eriodendron anfractuosum*, DC.). This tree grows from sea level up to an altitude of 2,000 ft. and even more, but principally in low-lying ground, say below 800 ft. above sea level, where the best kapok is produced. Although in higher altitudes the tree gives a certain amount of fruit, the quantity is smaller and the fruit comes later in the year. The product is also of inferior quality because the fruit often is unripe when the rains begin, so that it either does not ripen altogether or the cotton gets spoiled by the rain water entering the opened pod.

The best land for the cultivation of kapok is porous, sandy-clay soil near the sea level or a little above it, in a climate with a dry east monsoon. On

sandy soil like that in Kediri, Java, the trees also grow very well. Wet east monsoons always have a bad influence, both on the setting of the fruit and on the quality of the cotton.

METHODS OF PROPAGATION.

The kapok tree can be grown either from cutting or from seed. From cuttings it is very easily grown, as nearly every piece of the tree, even of pretty old ones, will grow when put in the ground, but it is better to propagate it from seeds, if only for the reason that no trees need be destroyed for the purpose.

The seed must be planted at the beginning or about the middle of the west monsoon in seed beds which must be only lightly covered. If the soil is poor it is recommended that some old stable manure be put in about 10 days before sowing. Care must be taken that the plants in the seed beds do not stand too close together. The best way is to sow in rows at a distance of from 25 to 30 centimetres. The distance can vary according to the richness of the soil.

As soon as the young plants are about 10 to 15 centimetres high the covering can be taken away gradually, so that some 20 days after sprouting they are exposed to the full sun. This is necessary because kapok requires a great deal of sun, and when too much shaded it grows thin and lanky. Soon after taking away the covering is the best time for removing the poorest plants, as it can then be seen which plants are the hardiest. No work is necessary on the seed beds except weeding, but if there is a long period of dry weather it is necessary to water the plants or better still to irrigate the soil. About the beginning of the following west monsoon the young trees can be planted out.

Transplanting.—Kapok is often planted along the roads on the coffee and cacao plantations. A distance of from 12 to 15 ft. between the trees is usually sufficient. It is recommended to plant the kapok when the plantation is newly opened up. If the plantation is older, and already gives shade, it will happen very often that the kapok grows lanky and forms into thin trees with few branches.

If kapok is to be the chief product, and the whole land is planted therewith, it is recommended to plant not more than 250 trees per bhow (1·75 acre), as when closer together the trees soon interfere with one another. This is the case when the soil is rich and the land low. If the soil is not so good, or if situated at a higher altitude, shorter distances between the trees may be allowed.

Before transplanting it is best to strip off all the leaves and to cut the tree itself down to a height of 1½ or 2 ft., also cut the chief roots so as to make stumps of them. Of such stumps a large percentage will grow. After a year it cannot be seen where the cutting has been done. If the tree is not cut short the top will usually die right down to the ground, which of course means that the growth of the new top will be retarded even if the whole tree does not die. It is recommended that holes be made in advance in which to plant the trees. It is necessary to keep the soil thoroughly free from weeds, especially from cogon.

INTERTILLED CROPS.

During the first years one can plant other products between the young trees provided care is taken not to plant too near to them and not to touch the roots. It is best to plant between the trees such products as require much sun. It must be remembered, however, that the kapok tree during a great part of the east monsoon has no leaves, and that all plants feed on the soil, so that manuring may be necessary.

THE HARVEST.

Under favourable circumstances the kapok trees begin to produce in the third year. As only a very few regular kapok plantations exist at present,

it cannot be stated how large the production will be. A favourably situated plantation in the centre of Java, where extensive and regular cultivation of kapok exists, yields during the fifth year about 5 piculs of pure kapok from 250 trees per blow. Older plantations give more kapok than younger ones. Sometimes isolated and very strong trees yield much larger quantities, and cases have been known where one tree in 1 year gave 1 picul of clean kapok, but this is, of course, exceptional.

The kapok flowers about the end of the west monsoon or the beginning of the east monsoon. The fruit ripens towards the end of the east monsoon. When the fruit is ripe it has a yellow-brownish colour. It is necessary then to harvest as soon as possible, as otherwise the fruit, when hanging too long a time bursts at the top end, whereby the rain gets inside and the cotton is blown out by the wind.

It is recommended to open the harvested fruit as soon as possible and to take the cotton out. If this is not done quickly the colour and the gloss get spoiled. Also, if the fruit has been wet by rain it is better to take out the cotton before drying it.

It is very bad to cut off the fruit before it is ripe and by fermentation try to give the cotton the appearance of being cut ripe, as has been done recently on account of the high price of kapok. Such a product is always inferior and its presence in a few bales can considerably reduce the value of the whole. In case the heavy rains or late harvesting make it necessary to collect the last fruit in an unripe state, such products must be always kept separate and sold as second quality. It is also very bad to moisten the kapok so as to increase the weight.

METHODS OF GINNING.

The seeds are separated from the cotton by beating with sticks. Small quantities of kapok are usually cleaned by hand. The kapok is usually laid on bamboo tables and beaten with thin bamboo sticks, so that the seeds drop through the bamboo and the kapok remains on the table. When in large quantities, the kapok is cleaned in mills consisting of a horizontal cylinder of wood or iron with rows of pins placed perpendicularly on the inside of the cylinder. Inside the cylinder a shaft turns round on which pins are put in such a way that they almost meet those in the cylinder. At one end of the cylinder the kapok is put while at the other side there is an opening for taking out the cleaned kapok. Over the whole length of the bottom of the cylinder, wire netting is placed, through which the seed can drop. Such a mill can be operated by hand or by machine. Other machinery for cleaning kapok is not used in Java.

It is of great importance that no seed should remain, for if the kapok contains even a few of them it has a bad effect on the market price. Formerly the kapok was beaten till the curly part on the cotton disappeared altogether, but lately this part is preferred, so that the kapok must not be beaten more than is necessary to get the seed out. The weight of cleaned cotton in one pod is about one-half the weight of the seed.

BALING AND SHIPPING.

For shipping, the kapok is packed in bales by means of hydraulic or hand presses of more or less the same character as those used for tobacco. The weight of a bale is about 36½ kilos with dimensions of 53 by 75 by 99 centimetres. These are the dimensions immediately after pressing, but they vary slightly, as the kapok expands considerably after it has been pressed. To prevent this, sometimes two bales are put together in the press with iron hoops. As the freight is calculated by measurement, it is of importance to have as small bales as possible. Still the kapok must not be pressed till it loses its springiness, as it thereby loses in value. Sometimes bales weigh about 40 kilos measuring 80 by 63 by 68 centimetres. The bale is usually covered with gunny or matting. In Holland they prefer mats, as the tare is less variable; for Australia gunny is generally used.

THE VALUE OF THE SEED.

From the seed, oil is pressed or extracted which is used as a table oil and for making soap. After taking off the skin, which weighs about 45 per cent. of the weight of the seed, the seeds give about 25 per cent. of oil. The residue is a very good manure containing about 5 per cent. of nitrogen. The greater part of the seed is not made into oil in Java, but is exported, principally to Marseilles. Where it is difficult to press the oil out of the seed or to sell it, it is usually ground into pulp and used for manure. The skin of the seed can be burned or put in heaps exposed to the rain and the wind till all is rotten and then used as manure. It is always recommended to use such manure on kapok plantations.

ENEMIES OF KAPOK.

As yet kapok suffers little from diseases or attacks by insects. The most troublesome pest is the insect *Botacera hector*, which can kill the trees, but is fortunately rare. The best way to fight this insect is, as soon as one sees the holes in the tree, to try to catch it with a bit of wire, or, if this cannot be done, to put a small quantity of benzine in the hole and seal it up with clay.

Helopeltis sometimes attacks the leaves, but it is rare in kapok. In general, so far the damage to kapok by insects is very small, whilst other diseases produced by fungi are unknown. Sometimes damage is done by a parasite (*Loranthaceen, Jav. pasilan*) which nestles on the branches and causes them to die. As these parasites multiply very quickly by seed it is recommended to cut them out regularly, also the ends of the branches if they show signs of dying. The best time for doing this is after the west monsoon. Bats are very fond of the young fruit.

Times of Sunrise and Sunset at Brisbane, 1910.

DATE.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·29	5·47	4·58	6·5	4·46	6·28
2	6·2	5 34	5·28	5·48	4 58	6 6	4·46	6·28
3	6·1	5·34	5·27	5·48	4·57	6·7	4·46	6·29
4	6 0	5·35	5·26	5·49	4·56	6 7	4·46	6·30
5	5·59	5 35	5·25	5·49	4·56	6·8	4·46	6·31
6	5·58	5 36	5·24	5 50	4·55	6 9	4·46	6·31
7	5·57	5·36	5 23	5·50	4·54	6·9	4·46	6 32
8	5·56	5·37	5·21	5·50	4·54	6·10	4·46	6·33
9	5·54	5 37	5·20	5·51	4·53	6·11	4·46	6 33
10	5·53	5 37	5·19	5·52	4 52	6·11	4 47	6·34
11	5 52	5·38	5·18	5·52	4·52	6·12	4·47	6·35
12	5 51	5·38	5·17	5·53	4 51	6·13	4·47	6·36
13	5·50	5·39	5·16	5·53	4 51	6·14	4·47	6·36
14	5·49	5·39	5·15	5·54	4·50	6·14	4·48	6·37
15	5·48	5·40	5·14	5·54	4 50	6·15	4·48	6·37
16	5·46	5·40	5·13	5 55	4·49	6·16	4·48	6 38
17	5·45	5·41	5·12	5·56	4·49	6 17	4·48	6·39
18	5·44	5·42	5·11	5·56	4·49	6·18	4·49	6·39
19	5·43	5·42	5 10	5·57	4 48	6·18	4 49	6·40
20	5 42	5·42	5·9	5·57	4·48	6·19	4·50	6 40
21	5·41	5·42	5 8	5·58	4·47	6·20	4 50	3·41
22	5·40	5·43	5 7	5·58	4·47	6·21	4·51	6 42
23	5·38	5·43	5·6	5 59	4·47	6·22	4·51	6·42
24	5·37	5·44	5·5	6 0	4·47	6·22	4·52	6·43
25	5·36	5 44	5·4	6·0	4·47	6·23	4·52	6·43
26	5·35	5·45	5·4	6 1	4·46	6·24	4·53	6·43
27	5·34	5·45	5·3	6·2	4·46	6·25	4·53	6·44
28	5·33	5·46	5 2	6·2	4·46	6·25	4·54	6·44
29	5·32	5 46	5 1	6·3	4·46	6·26	4·54	6·44
30	5·30	5·47	5·0	6·4	4·46	6·27	4·55	6·45
31	...	...	4·59	6·5	...	...	4·56	6·45

PHASES OF THE MOON.

			H.	M.	
4 Sept.	●	New Moon	4	6	a.m.
12 ,,	☾	First Quarter	6	11	,,
19 ,,	○	Full Moon	2	52	p.m.
26 ,,	☽	Last Quarter	6	54	a.m.
3 Oct.	●	New Moon	6	32	p.m.
11 ,,	☾	First Quarter	11	40	,,
19 ,,	○	Full Moon	0	21	a.m.
25 ,,	☽	Last Quarter	3	48	p.m.
2 Nov.	●	New Moon	11	56	a.m.
10 ,,	☾	First Quarter	3	29	p.m.
17 ,,	○	Full Moon	10	25	a.m.
24 ,,	☽	Last Quarter	4	13	,,
2 Dec.	●	New Moon	7	11	a.m.
10 ,,	☾	First Quarter	5	5	,,
16 ,,	○	Full Moon	9	5	p.m.
23 ,,	☽	Last Quarter	8	36	,,

Horticulture

TERMS USED IN HORTICULTURE.

In reading notes on gardening, amateurs are often placed at a disadvantage through failure to grasp the meaning of some of the more common terms used to distinguish the different classes of flowering plants which find a place in our gardens. A few brief notes on this classification may therefore be of service.

Thus—An annual is a plant which completes the whole cycle of its life in one season, so that to grow this class continuously it is necessary to sow seed each year. Annuals are divided, as far as outdoor work goes, into two main divisions—viz., Hardy and Half Hardy. These are English terms, and are not perhaps quite exact for our conditions, but are sufficiently accurate for common use. In seedsmen's catalogues they are always distinguished by the letters H.A. or H.H.A.

Hardy annuals are those which it is best to sow in the open from autumn to early winter, to flower in the spring and early summer. As a rule they are impatient of great heat. Half-hardy annuals are those which are sown in spring and early summer, for summer and autumn flowering. As long as they have sufficient water they will stand almost any amount of heat. As a broad distinction the above is correct.

A Biennial is a plant which is grown from seed one year, and, after taking a whole season to grow, flowers and produces seed in the second season. Such plants may often be made to last over a third season by removing the flowers as they begin to go off, thus preventing them from producing seed. The plants are then cut back, and a new growth takes place. Many may also be continued by means of cuttings.

Perennials are plants which, under natural conditions, live for more than two years. They may be propagated by seed, cuttings, layers, and division of the root.

Seed of biennial and perennial plants may be sown either in autumn or spring. Under normal conditions the former is to be preferred. Cuttings, layers, or division of the roots, may also be put in during these periods.

Herbaceous plants are those which have the nature, texture, and characteristics of the common herbs. They produce annual flowering stems on a perennial root, but perennial plants are not necessarily herbaceous. No annuals are classed as herbaceous, though in top growth some of them show the same character as the herbs.

A succulent plant is one which has thick, soft, juicy leaves. They are specially adapted to dry countries and situations. They have very few evaporating pores in their thick skins, and few roots. Among the larger plants the Cacti are the most typical examples. They may be either annual, biennial, or perennial.—"Garden and Field."

Science.

ALCOHOL FROM SISAL FACTORY REFUSE.

For many years the question of the utilisation of the enormous quantity of refuse resulting from the decortication of sisal leaves, amounting to from 92 to 96 per cent. of the weight of the leaves, has occupied the attention of scientific men, chemists, and others, and suggestions have been made that it could be manufactured into paper or utilised as manure, or that the juice might be employed in the coagulation of rubber latex. But no practical result has followed on these suggestions.

The "Journal d'Agriculture Tropicale" now publishes a long but most interesting article by M. d'Hérelle on a very different mode of utilising the "bagasse." We regret that our limits will not allow of the reproduction of the whole article, but the following *résumé* will serve to indicate the laborious and eventually successful work of the writer in the production of alcohol from henequen (sisal) bagasse. M. d'Hérelle at the outset states that, although in this article he has confined himself to the refuse of the *Agave rigida*, var. *sisalana*, of Yucatan, yet his experiments have proved that alcohol may be obtained also from other species of the Agave family. For instance, he obtained a larger quantity of alcohol from some leaves sent him from Spain than from sisal, weight for weight of leaves. (This was probably *Agave americana*.) The residue after decortication, he says, represents from 92 to 96 per cent. of the weight of leaves, and consists of a mixture of pulp and more or less fibrous matter. So far this residue has been carted out into the fields and there allowed to rot, although much of it is eaten by stock The residue is shown by analysis to contain saccharine matter and other soluble carbo-hydrates. The fact that for a long time chemists had noted the presence of sugar in Agave leaves, coupled with the further fact that plants of the same species are utilised in the manufacture of fermented liquor (pulgue) and spirituous liquor (téquila) gave rise to the supposition that alcohol could be obtained by a special treatment of the residues.

The residues contain different quantites of water, volatile substances, and dry matter at different seasons of the year, the former varying from 79.1 per cent. in May to 86.1 per cent. in August, while the dry matter is largest in May—20.9 per cent.—and least in August—13.9 per cent.

This dry residue contains by analysis:—

	May.	July.	August.
Mineral matter	6.5	7.18	7.05
Nitrogenous matter	3.3	2.60	2.49
Reducible sugar	3.8	3.63	14.40
Other sugar	22.8	15.45	28.72
Other soluble carbo-hydrates ..	25.9	28.77	20.77
Cellulose, vasculose, lignose ..	37.7	42.37	26.57
	100.00	100.00	100.00

At different seasons the sugars undergo chemical transformations, not indicated by the appearance of leaves which are kept in the shade.

The quantity of saccharine matter having been determined, it only remains to cause it to ferment. Then a difficulty presented itself. Attempts to produce fermentation by various means failed, from two causes:

First, the strong organic acid due partly to oxalic acid, and, secondly, above all, to the presence of substances possessing properties antiseptic to the ferment employed. At last the patient chemist discovered an indigenous ferment which proved entirely satisfactory. The resulting alcohol represented 96 per cent. of the theoretic quantity. The Mexican Government lent its assistance by supplying a press and other apparatus constructed on M. d'Hérelle's plans. The alembic, however, was a twenty-year-old affair, which had been frequently repaired by plumbers. The residues were pressed by a hand press, and yielded 434 litres (litre = 1.76 pint) of 1,040 density. The cakes weighed 96 kilogramms (kilo. = 2.25 lb.) and contained 52 per cent. of moisture, whence a loss of 50 litres of juice The juice treated with 1 per 1,000 in weight of sulphuric acid was sterilised for twenty minutes at 120 degrees C. (248 degrees Fahr.) and then fermented with a pure culture of henequen ferment. Resulting alcohol: 17 litres (about 30 pints). On this, the Mexican Minister for Agriculture, who is the proprietor of the most important sisal plantation in Yucatan, commissioned M. d'Hérelle to erect and set in operation a distillery for treating the refuse of a sisal factory working up 175,000 leaves daily. After various trials of the best methods of extracting the juice by maceration or diffusion and by presses or rollers, maceration and diffusion proved unsatisfactory. Then bronze rollers were employed in a double set, and means for filtration were provided. The dry matter after expressing the juice could, after drying, be used as fuel for the boilers, in the same way as the bagasse of sugar-cane. Owing to sisal leaves being easier to crush than sugar-cane, only 30 h.p. was needed to drive the double set of rollers. The expressed juice runs into two tanks, which are cemented, and the cement is coated with paraffin, which, entering the pores, preserves it from the action of acids. Then the sulphuric acid in the proportion of 1 to 1,000 is added, after which the juice is sterilised. Without complete sterilisation, it is impossible to ferment the juice.

The steriliser is then described. M. d'Hérelle goes on to say that the fermentation of sisal must is such a delicate operation that only a chemist well up in fermentation work can conduct it satisfactorily.

The distillery installation comprises:—

1. An apparatus for cultivation the ferment of a capacity of 850 litres.
2. Two intermediate copper vats, each of 6,000 litres capacity.
3. Twelve wooden fermenting vats, each of 18,000 litres capacity.

With such an apparatus the juice of 150,000 leaves can easily be treated in ten hours, or 200,000 leaves in fourteen hours. The distillery apparatus is equal to producing 2,800 litres of alcohol at 96 degrees in twelve hours. The alcohol is of splendid quality, and may be used for human consumption.

The distillery apparatus used by M. d'Hérelle at first yielded 13 litres of alcohol per 1,000 leaves, but this later on he hoped to increase to 16 litres. The staff of the establishment consists of a micro-biological chemist, a director, a European distiller, and eight men.

Summing up, he says, that even with a 14-litre production, the extraction of alcohol from sisal is a very remunerative industry, since the primary material costs nothing. An installation such as here described would cost, with all the best appliances, 300,000 francs (£12,500).

But this does not exhaust the product of the plants, for the tall flower-pole, cut in pieces, is also treated, and each moderate-sized pole gives an average of 1¼ litres of alcohol. In Yucatan, a plantation working off 150,000 leaves a day, will, every year have 175,000 poles to treat, besides the trunks of the plants. The total production of alcohol on such a plantation would be 7,400 hectolitres a year (162,800 gallons).

General Notes.

FREAK MAIZE.

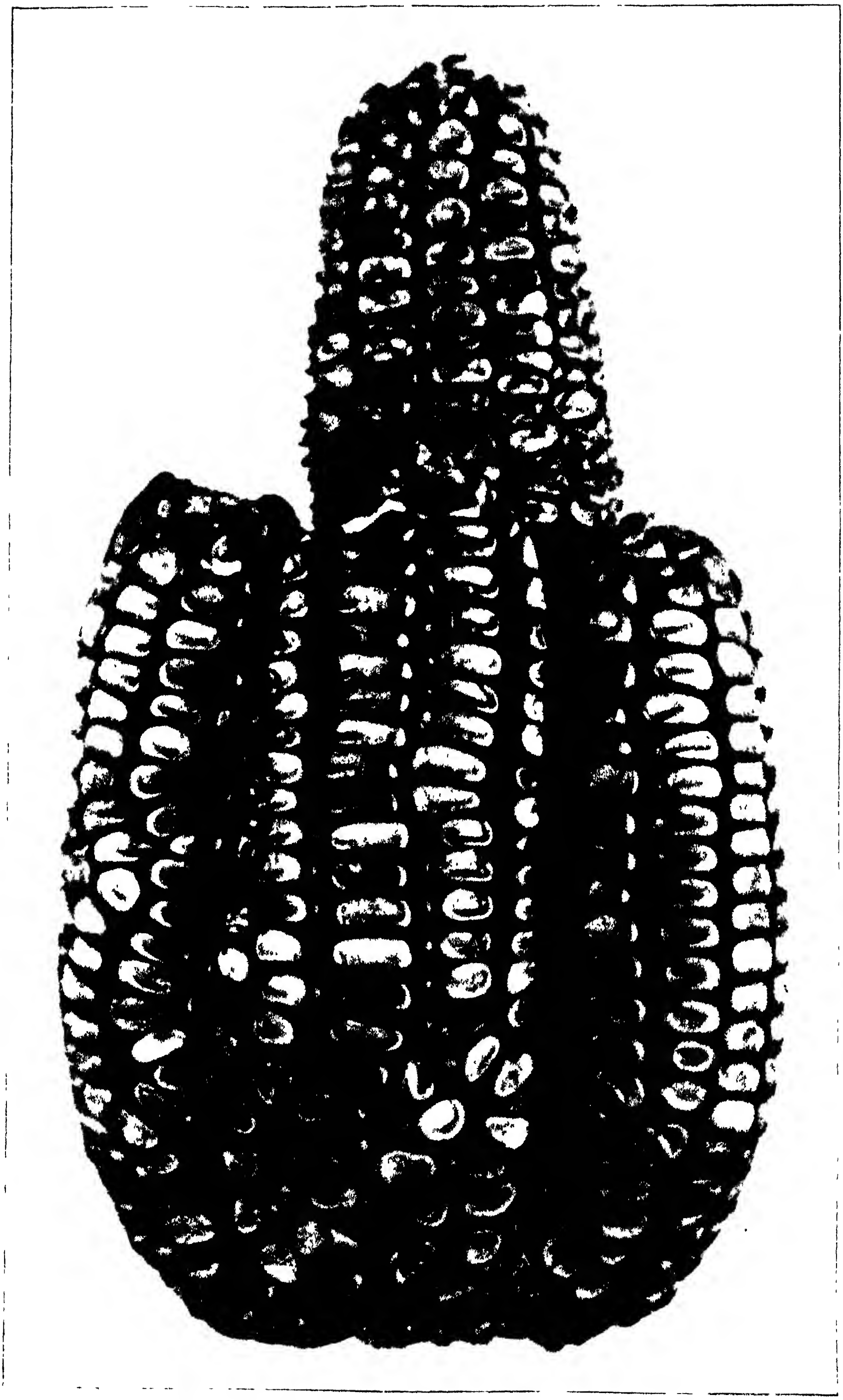
The accompanying illustration shows a peculiar growth of a maize cob, several of which occurred in a fine crop of maize grown by Mr. K. Mackenzie on his farm near Kingaroy. The crop, which is grown on rich scrub soil, has come on splendidly, and the yield is éstimated at 130 bushels per acre. It is remarkable what heavy crops have been the rule during this season in many districts widely apart from each other. In the Far North, about Atherton, many farmers have had a return of from 100 to 120 bushels per acre, or three times as much as is generally considered an average fair yield. No doubt the splendid seasons we have experienced have a great deal to do with these splendid results, but an important factor is, probably, the selection of seed and good methods of cultivation by the growers. The cob here shown has six smaller cobs growing round and close to the main cob, all closely filled with good, large, marketable grain.

AUSTRALIAN TICKS IN GERMAN NEW GUINEA.

An English journal states that 15 years ago an attempt was made to breed Australian cattle in German New Guinea, and the enterprise was successful, until the Queensland tick was imported, which killed off the few herds that existed. Several experiments have lately been carried on with Australian cattle, but without any success, as the ticks attack them, they suffer from redwater, and die within 6 to 8 weeks. The only cattle that seem to endure the climate and withstand the attack of the Australian tick are an inferior kind imported from Java. Experts are at present trying what they can do by crossing these Java cows with Siam and Bengali bulls. The cross of these seem to be fairly sturdy animals. Still, the opinion is expressed that the colony never can be a great cattle-raising country. Experiments in breeding Australian horses, and also in crossing Australian with Java ponies, have been made, but without very satisfactory results. Horse-breeding will never be a success, according to one authority, in German New Guinea. Australian merino cross-bred sheep have been tried there without success. They suffer from foot-rot, caused by the great humidity of the climate. Experiments are at present being carried out with sheep in Java, which, so far, seem to have met with some success, although the flesh of such sheep is of very inferior quality, and will never be esteemed as good table meat.

In connection with the presence of cattle ticks and consequently of redwater in German New Guinea, it is remarkable that these ticks, if they do exist as here stated, have not, in the course of 15 years, found their way to British New Guinea. There are several herds of fine milking cattle in the British territory, notably at Yule Island, and in the neighbourhood of Port Moresby and Samarai. In the "Hand Book of the Territory of Papua," compiled by the Administrator, the Hon. Staniforth Smith, will be found a very good illustration showing part of a dairy herd near Samarai. There are probably some 700 to 800 head of horned cattle in the Territory, and none have ever shown signs of being affected by ticks or redwater. There are large areas of magnificent park-like pasture land

Plate XV.



Freak Corn, Grown on Mr. K. Mackenzie's Farm, Kingaroy.

in various districts, especially on the road from Rigo to the Government Nursery on the Kemp Welch River, and quite close to Port Moresby numbers of stock of all descriptions are pastured on rolling plains covered with excellent fodder grasses. There are very few sheep kept anywhere on the coast or inland. Possibly Papuan coast lands, like those of Queensland, are not suitable for this class of stock. Recently some ticks were discovered on a horse, on the Laka River Estate, east of the Kemp Welch River. The manager, Mr. Manning, sent some of these to the Department of Agriculture and Stock, where they were examined by the Government Entomologist, Mr. Hy. Tryon, who pronounced them to be perfectly harmless to cattle, and in no wise related to the cattle tick of Australia.

THE COSTLIEST EAR OF CORN IN THE WORLD.

The "Scientific American" of 4th June last has an illustration of ten champion ears of corn, which were sold at the rate of 2,345 dollars (£469) per bushel, or 335 dollars (£67) for the ten ears, one of the highest prices, if not *the* highest price ever paid for that number of ears of corn. The champion single ear of corn was sold at the Omaha (Nebraska) National Corn Show for 85 dollars (£17), or at the rate of 5,950 dollars (£1,100) per bushel, which is said to be the highest price ever paid for a single ear of corn. The champion ten ears shown in the illustration averaged 10½ in. in length, and 7¾ in. in circumference, each ear carrying twenty rows of kernels, the depth of the kernels being ¾-in., and the average weight of each ear was 20 oz. Verily, corn is king in America. Prize agricultural products such as these may not be adapted to all localities, for which reason one must not be misled by the awards of a prize. The price at which the ears are sold may be fictitious, or a forced one. A farmer may take a prize at a show. When the corn is put up to auction, the farmer having received a large amount as premium for the champion corn, can afford to bid for it at a higher price than his competitors. The high price paid would, therefore, be for advertising purposes. Lastly, it must be considered that from a large field of corn, some large specimens may be selected, but this does not prove that the selected specimens are the best, but merely the largest.

We heard last week that a farmer at Wondai has 1,100 acres of corn which will probably yield over 60 bushels per acre. That means that his crop will amount to 66,000 bushels. At the price paid for the American champion corn, the cash value would amount to £78,540,000. Yet the highest price that farmers can command in Queensland at the present day is about 2s. 4d. per bushel, or £7,700, out of which have to be paid the cost of planting, seed, cultivation, harvesting, husking and shelling, bags, cartage, freight, and commission.

Answers to Correspondents.

COCONUTS.

INTENDING PLANTER, Cairns.—

The average yield of coconuts per tree is usually set down as sixty nuts per annum; but numerous instances have been given of trees yielding 100 nuts, and even more, per tree. We have seen numbers of trees in Papua from which 100 good nuts were obtained, and as many more left for the next crop. In the April number of the "Journal of the Board of Agriculture" of British Guiana (Demerara), mention is made of a very prolific coconut palm. Mr. E. B. Copeland, Dean of the College of Agriculture of the Philippines, is said to have written to the "Agricultural Bulletin of the S. and F.M. States": "The Mora Plantation and Development Company has a coconut-tree near Zamboanga, from which 106 nuts were taken at one cutting, and 112 two months later. I saw the tree less than two months later still, and it seemed to have fully 100 nuts ready to harvest again."

HEIFER'S FIRST CALF.

HEIFER, Mullett Creek.—

Mr Graham, Government Dairy Expert, states that there is not the slightest warrant for the supposition that a bull, being a heifer's first calf, will be of no value for stud purposes. On the contrary, some of the best bulls he has known have been first calves. True, in the case of twins, one may prove barren, but that does not prove that a heifer's first calf will prove valueless. He would certainly not advise the destruction of the calf if of a good breed.

EXTERMINATING ANTS—THE PUMPKIN BEETLE

R. MCDOUGALL, Mahrune, Jondaryan.—

The information you ask for concerning the destruction of ants has frequently given in the Journal. See January and June, 1908, August, 1909, and March, 1910.

Full information as to the life history, and methods of combating the pumpkin beetle were given in exhaustive articles by Mr. H. Tryon, Government Entomologist and Vegetable Pathologist, in the following issues of the Journal:—January, 1908; January and March, 1909; August, 1910. The articles are too long to be republished in this column, but copies may be obtained on application to Mr. H. Tryon.

STEPHANOTIS.

STEPHANOTIS, Mullett Creek.—

The probable reason why your plant does not thrive is that the land on which it is growing is badly drained and too much in the shade. Overwatering, with no get-away for surplus moisture is injurious to the plant, and induces the white scale. Either drain the bed or remove the plant. For the scale spray with kerosene emulsion, or some resin compound, or even nicotine and soap. If the plant is badly affected, take it up and immerse it for a few hours in a solution of tobacco-water. (*See* "Flower Gardening for Amateurs," issued by this Department.) For kerosene emulsion, take ½ lb. soap and 2 gallons kerosene. Resin wash: Pounded resin, 5 lb.; caustic soda (70 per cent.), 1 lb. (or washing soda, 3 lb.); fish oil, 1 pint; water to make 25 gallons. Boil the ingredients with water enough to cover for 1 or 2 hours, adding water slowly. Make the stock mixture 8 gallons, and, when using, dilute to the full amount. Use a very fine spray.

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	AUGUST. Prices.
Apples (Tasmanian), Eating, per case	6s. to 10s.
Apples (Cooking), per case	4s. to 5s.
Bananas (Cavendish), per dozen	4d. to 5d.
Bananas (Sugar), per dozen	2d. to 2½d.
Cape Gooseberries, per case	4s. 6d. to 5s.
Citrons, per cwt.	11s. 6d.
Cumquats, per quarter-case	1s. to 1s. 6d.
Custard Apples, per quarter-case	4s. to 5s. 6d.
Lemons (Lisbon), per case	3s. 6d. to 4s. 6d.
Mandarins, per half-case	3s. 6d. to 6s.
Mangoes, per case	
Nectarines, per half-case	.
Oranges (Local), per case	3s. to 5s. 6d.
Papaw Apples, per quarter-case	1s. to 1s. 6d.
Passion Fruit, per quarter-case	3s.
Peanuts, per pound	2½d. to 3½d.
Peaches, per quarter-case	...
Pears (choice), per quarter-case	...
Persimmons, per gin case	..
Pineapples (Ripley Queen), per dozen	8d. to 2s.
Pineapples (Smooth), per dozen	1s. 6d. to 6s. 6d.
Pineapples (Rough), per dozen	8d. to 2s.
Quinces, per case	.
Rosellas, per sugar-bag	.
Strawberries, per tray	1s. 6d. to 2s. 6d.
Tomatoes, per quarter-case	2s. to 3s. 6d.
SOUTHERN FRUIT MARKET.	
Apples (Local), choice, per case	6s. to 7s. 6d.
Apples (Jonathan), per case	6s. to 7s.
Apples (Cooking), per case	3s. 6d. to 4s.
Bananas (Queensland), per case	14s. to 16s.
Bananas (Queensland), per bunch	3s. to 4s. 6d.
Bananas, G.M. (Fiji), per case	10s. to 17s.
Bananas, G.M. (Fiji), per bunch	4s. to 5s.
Cocoanuts, per dozen	2s. to 2s. 6d.
Grapes, per box	...
Lemons (Italian), per half-case	...
Lemons (Local), per gin case	3s. to 4s.
Mandarins (Thorney), choice, per half-case	3s. to 3s. 6d.
Mandarins (Queensland), Emperor, per bushel case	6s. to 7s.
Oranges (Local), choice, per bushel case	4s. 6d. to 5s.
Oranges (Queensland), Navels, per bushel case	8s. to 9s.
Passion Fruit (choice), per half-case	3s. 6d. to 4s.
Peanuts, per lb.	5½d.
Pears (Victorian), choice, per bushel case	14s. to 16s.
Pears (Tasmanian), per quarter-case	7s. to 8s.
Persimmons (choice), per half-case	...
Pineapples (Queensland), Ripley, per case	3s. 6d. to 5s.
Pineapples (Queensland), common, per case	3s. 6d. to 5s.
Pineapples (Queensland), Queen's, per case	3s. 6d. to 5s.
Tomatoes (Queensland), choice, per half-case	3s. to 3s. 6d.
Water melons (Local), large, per dozen	...
Water melons, medium and small, per dozen	...
Strawberries (Queensland), per 3-quart tray	2s. to 3s.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR AUGUST.

Article.		AUGUST. Prices.
Bacon, Pineapple	lb.	7d. to 8d.
Barley, Malting	bush.	3s. 6d.
Bran	ton	£4 5s.
Butter, Factory	lb.	8d. to 9d.
Chaff, Mixed	cwt.	2s 9d. to 3s. 3d.
Chaff, Oaten (Imp.)	"	3s. 6d. to 5s. 3d.
Chaff, Lucerne	"	3s. 3d. to 3s. 7d.
Chaff, Wheaten	"	1s. 9d. to 2s.
Cheese	lb.	3d. to 4½d.
Flour	ton	£8 10d. to £9 10s.
Hay, Oaten (Imp.)	"	£5 15s. to £6.
Hay, Lucerne	"	£2 to £3 10s.
Honey	lb.	2½d. to 2¾d.
Maize	bush.	1s. to 2s. 3d.
Oats	"	3s. 2d. to 3s. 8d.
Pollard	ton	£4 12s. 6d.
Potatoes	"	£1 15s. to £9 10s.
Potatoes, Sweet	cwt.	1s. to 1s. 3d.
Pumpkins	"	1s. to 3s. [illegible]d.
Wheat, Milling	bush.	4s.
Wheat, Chick	"	...
Onions	ton	£5 5s.
Hams	lb.	11d. to 1s.
Eggs	doz.	7½d. to 8½d.
Fowls	pair	2s. 6d. to 3s. 6d.
Geese	"	6s. 6d. to 7s.
Ducks, English	"	3s. 8d. to 5s.
Ducks, Muscovy	"	4s. to 5s.
Turkeys (Hens)	"	6s to 6s. 3d.
Turkeys (Gobblers)	"	8s. 6d. to 11s. 6d.

ENOGGERA SALEYARDS.

Animal.	JULY. Prices.
Bullocks	£9 to £10 17s. 6d.
Ditto (single)	...
Cows	£6 15s. to £8 2s. 6d.
Merino Wethers	24s.
Crossbred Wethers	20s.
Merino Ewes	19s. 3d.
Crossbred Ewes	21s. 3d.
Comebacks	...
Lambs	15s.

THE WORLD'S COTTON CROP RETURNS.

(In thousands of bales.)

Season.		America.	India.	Egypt.	*Brazil, &c.	Total
1903-4	..	10,124	4,471	797	2,760	18,152
1904-5	..	13,557	4,061	843	2,172	20,633
1905-6	..	11,320	4,797	798	2,542	19,457
1906-7	..	13,550	5,197	926	2,803	22,476
1907-8	..	11,582	4,445	965	2,867	19,859
1908-9	..	13,820	4,665	910	3,063	22,467

THE PRICE OF COTTON

The latest quotations for Upland cotton are 8d. per lb.; for Sea Island (long staple), from 14d.; for good fair to 24d. for superfine.

RUBBER.

Pará, 11s. 2d. to 11s. 4d. Fine crêpe plantation rubber, 10s 10d. to 12s. 4d. per lb.

*Including all other countries

Farm and Garden Notes for October.

FIELD.—With the advent of the warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, sorghum, setaria, imphee, prairie grass, panicum, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred. The planting of the sisal agave and the fourcroya may be proceeded with at any time of the year, but the best time is in spring and beginning of summer, when warm weather and good showers will enable the young plants to root quickly and become firmly established before the winter. The demand for the fibre is constantly increasing, and the supply does not nearly overtake the demand; hence prices keep high, and the outlook for the future is very promising. See our instructions in "The Sisal Industry in Queensland," obtainable free by intending planters on application to the Under Secretary, Department of Agriculture and Stock. Plant only on dry and well-drained soil. Cotton may still be sown.

KITCHEN GARDEN.—Our notes for this month will not vary much from those for September. Sowings may be made of all kinds of vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf lima beans in rows 3 ft. apart with 18 in. between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the crops will be drawn and worthless. Thin out melon and cucumber plants. Give plenty of water and mulch tomato plants planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

FLOWER GARDEN.—The flower garden will now be showing the result of the care bestowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant chrysanthemums, gladiolus and other bulbs, such as tuberose, crinum, ismene, amaryllis, pancratium, hermocallis, hippeastrum, dahlias, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphis, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

Orchard Notes for October.

THE SOUTHERN COAST DISTRICTS.

As October is often a dry month throughout the greater part of the State, one of the most important duties of the fruit-grower is to keep his orchard or vineyard in a thorough state of cultivation, thus retaining the moisture in the soil that is essential to the setting and development of the fruit crop. As long as the land is level one cannot over-cultivate, as there is no danger of the soil washing, but when the orchard is on a hillside heavy thunderstorms, which may occur during the month, are very apt to cause heavy washaways of soil if the land is kept in the high state of tilth necessary to retain moisture. In this case the cultivation should always be across and not up and down the face of the hill, and where the soil is of such a nature that it will wash badly thin blocks, consisting of a row or two of a growing crop or of light timber, brushwood, or even a body of weeds or heavy mulching, should be provided, such blocks to follow the contour of the orchard. If dry, and water for irrigation is available, citrus trees will be the better for a thorough watering during the month. Give the trees a good soaking, and follow the irrigation by systematic cultivation, as this is much better than constant surface watering, as practised by the Chinese. Examine the orchard and vineyard carefully for pests of all kinds. When young trees are showing signs of scale insects, cyanide same; when leaf-eating insects of any kind are present, spray the plants that are being attacked with arsenate of lead. Look out carefully for black spot and oidium in grape vines, using Bordeaux mixture for the former and sulphur for the latter. When using sulphur, see that you get a fine sample—viz., one in which the particles of sulphur are in a very fine state, as the finer the sulphur the better the results. Do not apply the sulphur in the early morning, but during the heat of the day, as it is the sulphur fumes, not the sulphur, which do the good. A knapsack sulphurer is the best machine for applying sulphur to grape vines, trees, or plants.

Examine any late citrus fruits or early summer fruits for fruit fly, and take every precaution to keep this great pest in check now, as, if fought systematically now, it will not do anything like the same amount of damage later on as if neglected and allowed to increase unchecked. October is a good month for planting pineapples and bananas. Be sure and have the land properly prepared prior to planting, especially in the case of pineapples, as the deeper the land is worked and the better the state of tilth to which the surface soil is reduced the better the results, as I am satisfied that few crops will pay better for the extra work involved than pines.

TROPICAL COAST DISTRICTS.

As the fruit fly usually becomes more numerous at this time of year, especial care must be taken to examine the fruit thoroughly prior to shipment, and to cull out all fruit that has been attacked by the fiy. Banana and pineapple plants may be set out, and the orchards should be kept will tilled, so as to have the land clean and in good order before the heavy summer growth takes place.

All the spring crop of citrus fruits should be now marketed, and the trees, where necessary, should be pruned and sprayed, and the land be

well ploughed. The ploughing should be followed by harrowing and cultivating, so as to get the surface of the land into good order. Granadillas and papaws should be shipped to the Southern markets, as, if care is taken in packing and they are sent in the cool chamber, they will carry in good order. These fruits should not be gathered in an immature condition, as, if so, they will never ripen up properly. They should be fully developed but not soft, and if gathered in this condition, carefully handled, and packed and shipped in cool storage, they will reach the Southern markets in good condition, and, once they become more commonly known, will meet with a ready sale.

SOUTHERN AND CENTRAL TABLELANDS.

In the Stanthorpe district the spraying of apple, pear, and quince trees for codling moth will have to be carefully carried out, the best spray being arsenate of lead, of which there are several reliable brands on the market.

When fungus diseases, such as powdery mildew, &c., are also present, Bordeaux mixture should be combined with the arsenical spray.

The vineyard will require considerable attention, as the vines must be carefully disbudded, and any signs of oidium or black spot should be checked at once. Look out for late spring frosts, and, if possible, try the effect of smudge fires producing dense smoke for preventing any damage.

Keep the orchards and vineyards well cultivated, as it is of the utmost importance to keep the moisture in the soil at this time of the year if a good fruit crop is to be secured.

In the warmer districts cultivation is all-important, and when irrigation is available it should be used for both fruit trees and vines, a thorough soaking followed by systematic cultivation being given.

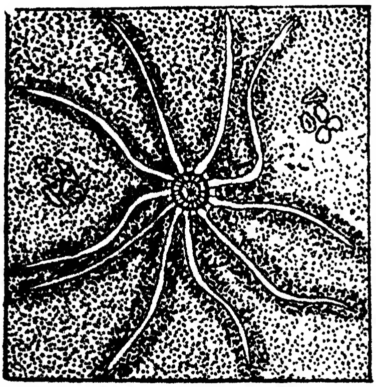
Plate XVI.

SUB-PACKER AND HARROW – ROMA STATE FARM.

Agriculture.

CAMPBELL'S METHOD OF DRY FARMING.

The Dry Farming Conference promoted by the Agricultural Department should prove interesting and instructive to agriculturists throughout the Commonwealth. It is now in progress in Sydney. The time is specially opportune, because so many leading farmers were in the city attending the Farmers and Settlers' Conference just closed. Professor Watt, recently appointed to the University, and Mr. G. L. Sutton, wheat experimentalist, provide the expert element; whilst Senator McColl, another speaker, has but recently returned from America, where he attended the Dry Farming Conference held last year. As a number of practical farmers are giving their initial experiences of this method of tillage, the blending of scientific and practical knowledge should be productive of much good. Dry farming, as it is termed to-day, is, after all, using methods that have been in the main adopted by the best agriculturists in South Australia for many years, and in more recent times in the dry districts of Victoria. More recently the most progressive agriculturists of this State have come in line with their neighbours, and fallowing, surface stirring, and thorough cultivation, including the drilling-in of seed, have become a recognised practice. There are, of course, a much larger proportion of farmers who do not follow methods which tend towards moisture conservation in the soil. Those farmers plough and sow their fields



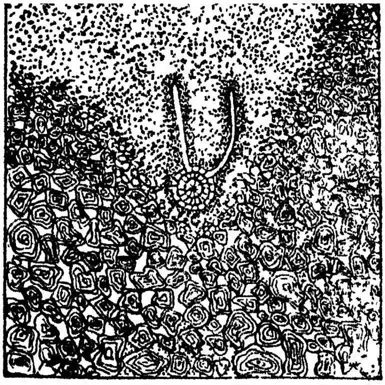
Development of Roots in Firm Soil.

This is a cross section of a lateral or branch root, very largely magnified, taken from Campbell's Manual.

yearly, and, therefore, have to depend entirely on the moisture that falls each season. In dry areas, or even moderately dry ones, this is an exceedingly risky practice. Fallowing and intelligent surface-stirring, or cultivation of soil, which is, in other words, dry farming, practically conserves the moisture obtained in two seasons for the benefit of one crop. It also gives the land a rest and allows the sun and air to beneficially affect it, whilst the extra cultivation received does its part towards improving the condition of the soil and making it more productive.

In some dry areas of the United States excellent results have followed the adoption of dry farming methods advocated by Professor Campbell, of Lincoln City, Nebraska. I spent some time with him during my recent visit to the United States, and he is indeed an enthusiast on dry farming. For

many years he has worked hard to bring intelligent methods to bear on the cultivation of large areas of country with a small rainfall, but with soil that will produce good crops provided sufficient moisture is available. Others, too, have been working out the same problem; and fallowing, with intelligent after-cultivation, has over there, as it has done in Australia, produced excellent



ROOT DEVELOPMENT IN LOOSE SOIL.
It will be seen that the lateral root is only able to send out two little feelers.

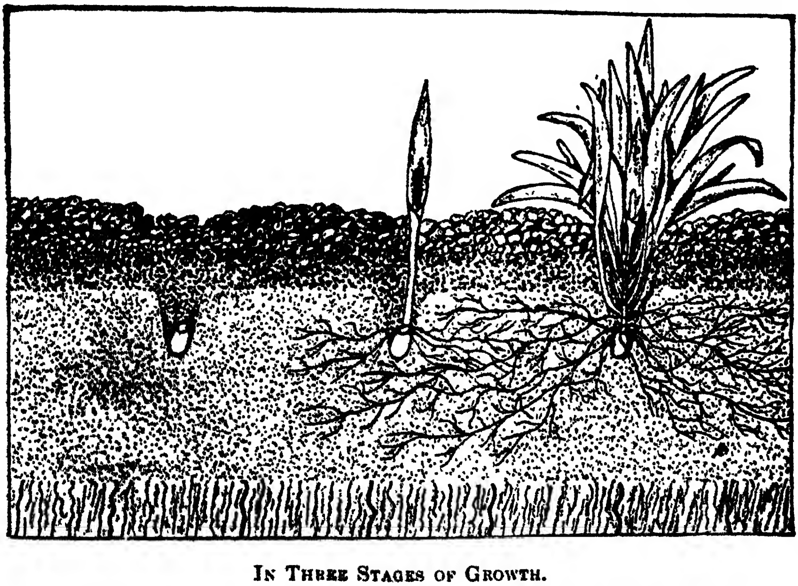
results. Professor Campbell claims the sub-packer to be an implement specially designed by him for compressing the soil and filling in all air spaces in the ploughed land. This implement has so far been but little used in the Commonwealth, but it seems to serve well the purpose for which it is intended. A number of Australians have visited Professor Campbell of recent years, and some of them have carried back misleading descriptions of the sub-packer, the implement for which so much is claimed in the United States. One stated that it was a sliding appliance which rubbed along the bottom of the furrow, leaving a smooth, shiny surface, which prevented the moisture from penetrating too far down for the plant roots of wheat to reach it. This description of the implement was altogether wrong.

WHEAT AND FIRM SOIL.
On the right is the plan generally followed by the farmers adhering to the old system; but on the left the benefit of using the sub-packer is demonstrated.

Writing on the question at that time, I pointed out that an implement such as the one described would be absolutely valueless. In porous soils it would not have the effect claimed for it by the writer referred to, and in a retentive subsoil it would, if anything, have an injurious effect. The sub-packer is, however, designed on more intelligent lines than those described, and has a rotary instead of a sliding motion. The picture shows the implement so clearly that but little explanation of its action is required. It is interesting to compare it with the other implements of ancient date.

Every intelligent farmer knows that the ploughed sods do not always lie closely together underneath. The openings or air spaces are larger or smaller, according to the condition of the soil at ploughing time. Without something is done to close up those air spaces, the best crop results cannot be obtained. This should be obvious to all those who have given the question any study, because when the roots, working down or around, come to those air spaces evil results must follow. It does not require much knowledge of agriculture, nor a great amount of common sense, to understand this much. Various methods of cultivation—such as scarifying, discing, and rolling—are employed in Australia to bring the ploughed land into proper condition for producing a profitable crop. The sub-packer is the implement used under the Campbell system, and splendid results are claimed for it.

It is drawn over the ploughed land like a roller. It is described in Campbell's "Soil Culture Manual" as follows:—"The sub-packer is an entirely new implement; the essential feature consists of a series of sharp wedge-shaped wheels that cut into the ground and literally wedge the portions between them together. These wheels exert both a lateral and a downward pressure, accomplishing a number of desirable results. They eliminate the air spaces left by overturning the furrow slice along the bottom and the sides of preceding furrows; press the earth firmly around the earth clods and stubble; aid in pulversing the soil, thus increasing its capillary attraction and its water-holding capacity: and at the same time they leave the surface soil loose and in a condition to prevent unnecessary loss of moisture through evaporation." The Campbell sub-packer probably does all that is claimed for it, but it cannot justly claim to be an entirely new implement. It at least is not made on a new principle, as is clearly shown by the illustration of



IN THREE STAGES OF GROWTH.

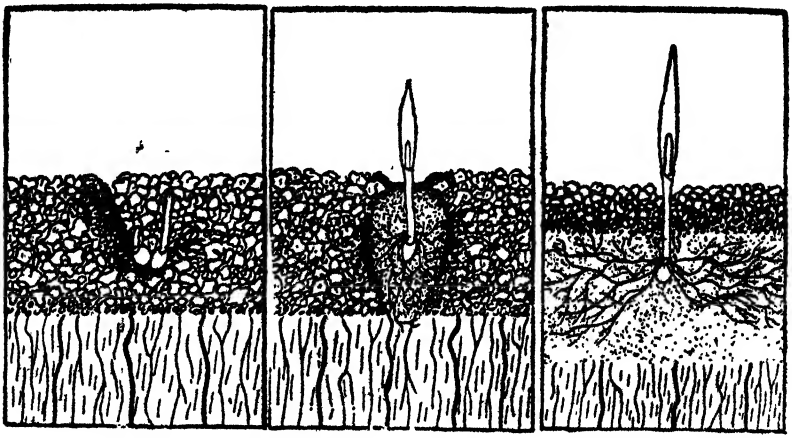
1. Kernel. 2. Single stalk. 3. Stooled out.

Professor Campbell considers this development reflects an ideal condition of soil through the use of the sub-packer.

Plenty's land presser. This is pictured in the "Dictionary of the Farm" by the Rev. W. L. Rham, vicar of Winkfield, Berkshire, England, in a new edition, published in 1848. It was also probably depicted in an earlier edition, for the author died in 1843. Plenty's land presser is described in the "Dictionary of the Farm" as follows:—"This instrument consists of two very heavy cast-iron wheels with angular edges set on an axle at a distance from each other equal to the width of the furrows, and a lighter wheel to keep the instrument vertical. It is drawn by a horse immediately after the plough, pressing two furrows at once and going twice over each furrow." The illustration does not show that the wheels have angular edges as described, but the art of illustrating was not so far advanced in those days as now, which accounts for the rounded appearance of the rims. There is, of course, this difference. That the Campbell sub-packer has a larger number of angular edged wheels than the old English land presser, but the single-furrow plough was universally used in those days, and other farm implements were proportionately small.

Another English land presser of a later date is also pictured here. It was depicted and described in "Cassell's Farmers' Handy Book" about twenty years ago. It was made in various sizes, and used to press land that had hollow spaces in it after ploughing. Thus it will be seen that the land presser is no new appliance, though it may now be adapted to uses for which it was not originally intended. It seems, however, that even in England, where farmers know nothing except by hearsay of dry farming, the land presser has been in use for generations.

Then, again, fallowing is described in "The Dictionary of the Farm," published in 1848, as follows:—"Fallow is a portion of land in which no seed is sown for a whole year, in order that the soil may be left exposed to the influence of the atmosphere, the weeds destroyed by repeated ploughings and harrowings, and the fertility improved at a less expense of manure than it would be if a crop had been raised on it." A further extract from the same volume states:—"The practice of fallowing land is as old as the Roman Empire. It appears that wherever the Romans extended their conquests and planted colonies they introduced this mode of restoring land to a certain degree of fertility when exhausted by bearing grain. The principle on which



Effect of Seeding with Different Drills.

1. Disc Drill. 2. Press Drill. 3. Closed Heel Shoe Drill.

This shows the progress of germination made by the various methods.

it was recommended, however, was erroneous. It was thought that the land grew tired of growing vegetable produce and required rest, and hence the rest was all that constituted fallow; the tillage, which alone is the improving part of the process, being almost entirely neglected." This indicates clearly that

the value of fallowing was acknowledged in very early times, and that British agriculturists many years ago knew that after cultivation surface stirring was necessary to secure best results from fallowing.

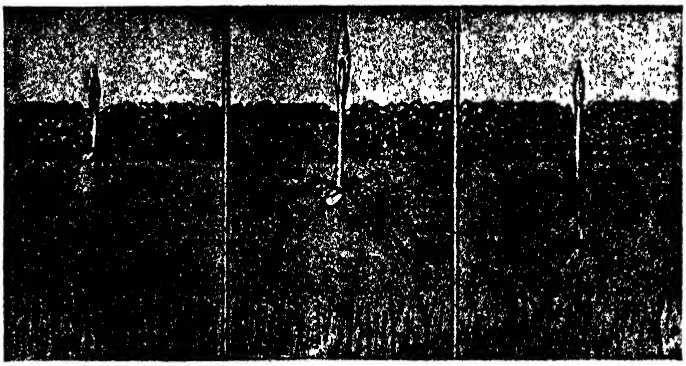
Professor Campbell strongly advocates the disc cultivator as a farm implement. He goes so far as to say that the disc should follow the reaper and binder at harvest time. He considers that the soil should not be exposed for a single day to the sun's rays after the crop has been cut. He says there is no other time of the year when the water held in the soil near the surface in sufficient quantities will bring about so many valuable chemical changes. It is at this season, he contends, that a vast amount of nitrates and bacteria may be developed, which, providing his other instructions are carried out intelligently, will cause the wheat plants to start off with a dark-green colour and force them to stool out well. He states that this accounts for the fact that the men who discs his crop in on stubble land sometimes gets a better

Professor R. W. Campbell,
The American Dry Farming Experimentalist.

crop than the man who ploughs his land. He further contends that, if there is any moisture, by preparing a fine mulch of a liberal thickness this moisture will accumulate in the firm soil just beneath. If no more rains come until the ploughing season, the ground is in perfect condition to plough, because the moisture has been retained by the action of the early discing.

The diameter of discs he also considers of much importance. The large-sized disc draws lighter, but its pulverising effect is not so good as that of the smaller one. The large disc revolves slower; consequently the pulverising effect is reduced as the size of the disc is increased. This should, of course, be obvious to all practical farmers, though it is certain that many have either not noticed it or have not placed any value on the extra pulverising effect by the small-sized disc. Here, again, it is evident that Professor Campbell is advocating a principle in agriculture that has been adopted by many farmers in Australia. A large proportion of agriculturists in parts of Victoria many years ago used the disc cultivator liberally on their fields after harvest, and some farmers in this State did likewise. This was, however, frequently done, mainly with the object of causing weeds and wild oats to germinate after the first rains came; consequently the discing did not take place until the harvest had been all gathered. It is, however, probable that farmers gained an additional advantage in the way indicated by Professor Campbell.

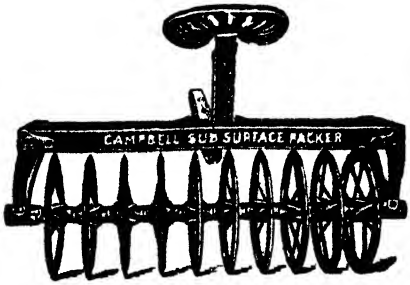
There has been much diversity of opinion amongst Australian agriculturists regarding the value of consolidating the soil by rolling. Many farmers roll their ploughed fields to break the lumps of clods, but the majority harrow the land afterwards to loosen the surface and prevent it from caking and losing moisture by evaporation. In years gone by a number rolled the land and left it in a smooth state. Others left one-half of a paddock smooth and the other half rough, by way of experiment. As a rule, the plants on the smooth surface appeared to do better than those where the land had been harrowed after seeding and rolling. The difference was, however, as a rule, more apparent than real, because the green blades showed more clearly on the rolled surface than on the harrowed one, though the latter may not have been what could be termed rough. If heavy rains fell before the young plants provided a good covering for the smooth rolled fields, the surface became baked, and this had an injurious effect on the crop. On the other hand, the harrowed surface kept in better condition under excessive moisture; consequently, as a rule, better returns were eventually received from fields which were finished with harrows than from those that were left in a rolled state. Some farmers did not roll at all before sowing, nor immediately after, no matter how rough and lumpy the land might be. They sowed the seed and harrowed the land, leaving the surface even more cloddy than Mr. Peacock, of the Bathurst Farm, would care to see. They, however, used the roller in the spring to break down the lumps after the crop had well covered the surface. This system frequently gave excellent results where the land was fresh and in good heart. Later on, however, in the older cereal-growing districts of the Commonwealth, when the soil lost its fertility through constant cropping on an exhaustive system, a change in methods was forced upon farmers. Fallowing gradually became popular, because the few who at first adopted this system obtained good results. It was found necessary, particularly in favourable seasons, to scarify or cultivate the fallowed land to destroy weeds. This cultivation was proved to have a good effect on the following crop, apart from keeping the land clean. So fallowing and surface tillage became popular with the most progressive agriculturists.



EFFECT OF VARIOUS DEPTHS OF SEEDING.
1. Too shallow. 2. Proper depth. 3. Too deep.

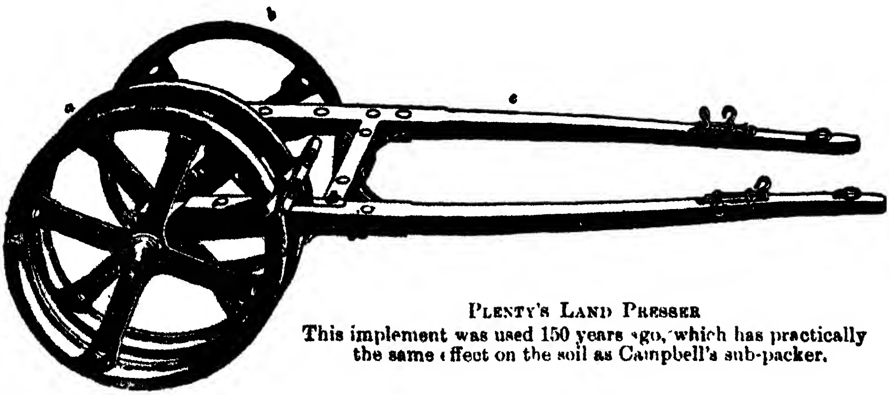
The question of filling up the air spaces in ploughed land is obviously an important one. Many farmers claim to be able to effect this by discing or cultivating in some other way. Professor Campbell, however, considers that the sub-surface packer does the work more effectively than any other implement. By the illustrations which appear on these pages he contrasts the results which follow the planting of seed in a loose sub-surface and a firm one. Those on paper appear much in favour of the plants rooting in firm soil, and present a good case for a firm seed bed with a loose surface covering.

It is recognised that where the soil is good water is the one element that may be needed to produce a crop. Such being the case, it is obvious that no water should be allowed to run off from farm lands. It should all be made to enter the soil. The rains of the semi-arid regions, as has been said, often come in the form of sudden and heavy showers. Such rains fill the upper soil completely. The open space becomes full of water, and, unless the lower soil



CAMPBELL'S SUB-SERVICE PACKER.

permits the excess to move down rapidly, much of the subsequent rainfall runs over the surface and off the fields. This loss of water and accompanying injury by washing is greater as the surface of the field is steeper. In the plains region the lands are generally level, and in this respect every opportunity is given the farmer to save the water. To enable the water to run down quickly into the lower soil, a deep bed of porous soil should be prepared. This does not mean that the soil should necessarily be loose and open, with large air spaces. It should be a mellow, close-grained mass, without any tendency to solidify or stick together. When the soil is in the condition described by saying it is in good tilth, it will take up water readily. This layer of fine, close-grained soil should be deep, in order that much water may be stored in it. Water occupying the interstitial spaces in this upper soil will slowly sink into the deeper soil. Thus, when the soil is properly prepared, the water of a heavy rain may be collected and held as in a sponge-like reservoir. It will sink down so as to equalise itself, and leave the soil in good condition for the surface tillage and for the development of plant roots. The tilth should be deepened gradually in semi-arid regions, as well as in humid ones, although less injury will result from turning up the better-weathered subsoil of the former.



PLENTY'S LAND PRESSER

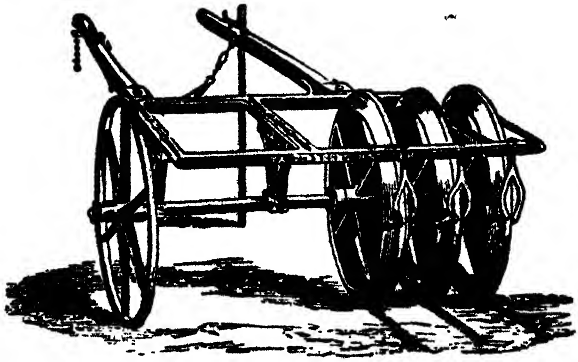
This implement was used 150 years ago, which has practically the same effect on the soil as Campbell's sub-packer.

Moisture in the soil is not alone valuable for its direct use by the plants, but it is one of the direct causes of increasing available fertility as well as bringing the land into the ideal physical condition necessary to produce large yields.

Proper tillage of the land has two important effects. First, the soil is brought into a desirable condition, so that there will be a deep, mellow, and, what is equally as important, firm root bed to absorb and store the rainfall and to prepare plant food; and, second, the loss of water by evaporation from the soil is prevented as far as possible. The operations of tillage may be summed up as the preparation of the seed bed, since it is universally applicable where dry farming is practised.

Treating Poorly-ploughed Land with a Campbell Packer.

It is a helpful and a hopeful sign when farmers in all parts of the country begin looking more to soil conditions than to weather conditions. Of course, soil condition is in part dependent upon the weather conditions, but not wholly so, for to a large extent man may overcome the deficiencies of the season, whatever they may be. Soil condition is dependent upon the proper amount of warmth, water, and air, and more indirectly upon the physical texture of the soil as it is maintained throughout the season. These things are in part in control of the farmer. Before the Dry Farming Conference is over, agriculturists should learn a good deal about what is being done in various parts of Australia, and also in other parts of the world. The men on the land should derive much benefit from their two weeks' work in the city.



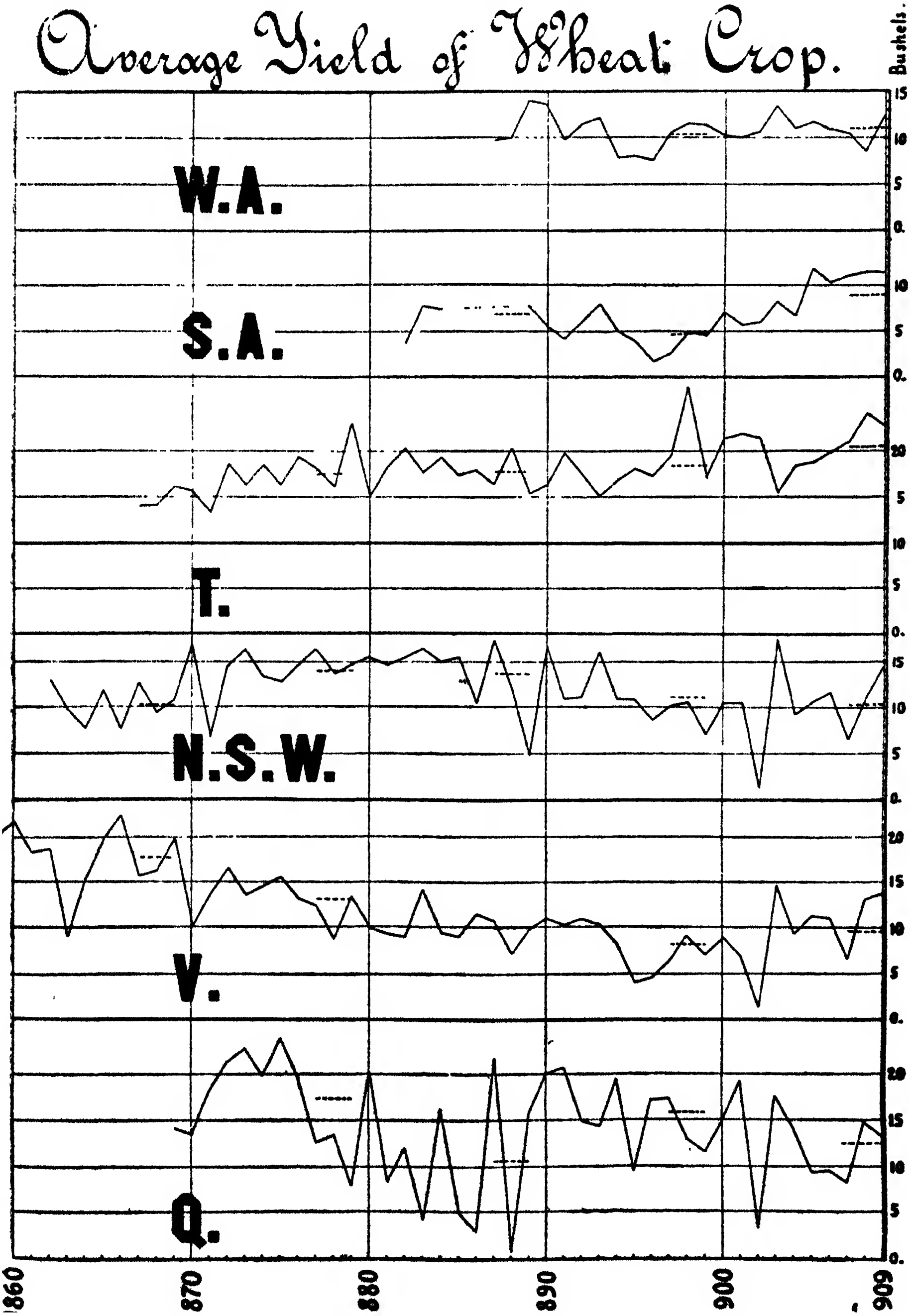
ANOTHER ANCIENT LAND PRESSER.
Used in the middle of last century, and is really an improvement on Plenty's implement.

[For the above article we are indebted to the "Sydney Mail," to which journal also our thanks are due for the illustrative blocks.—Ed. "Q.A.J."]

WHEAT CULTURE IN QUEENSLAND.

(Abstract of a Lecture delivered by J. C. Brünnich, Chemist to the Department of Agriculture and Stock.)

Mr. Thornhill Weedon, the Government Statistician, publishes every year a comprehensive report on the agricultural and pastoral industries of our State. Many of the figures should teach us a lesson, and the data in reference to the wheat culture are of particular interest.



The variation in the average yield of wheat in bushels per acre is very striking, and shows it to be greatly influenced by the seasons. I was able to obtain from Mr. Weedon the yields for all the Australian States, since ever wheat has been grown to any extent, and compiled this list of yields in form of a graph, which shows these annual variations very clearly. The drop in the drought years is distinctly shown, and in 1902 the average yield was exceedingly low in Queensland, Victoria, and New South Wales.

The Tasmanian climate appears to be the most favourable for wheat culture; the yield, therefore, with a rough average of 20.52 bushels per acre for the last year, is very satisfactory and the highest of all the States. Queensland comes second, with a rough average of 12.56 bushels (the true average being really 13.57 bushels), followed by Western Australia and New South Wales. South Australia shows the lowest yield, which, however, has been very constant during the last five years, and, as the culture is carried out on quite an exceptionally large scale, the cost of production is low, and even the average yield of about 11½ bushels obtained the last five years will return a good profit. I am told that the average cost of production is just about covered by a crop of 2 bushels per acre, which, of course, is exceedingly low, and could hardly be reached here in Queensland under existing conditions.

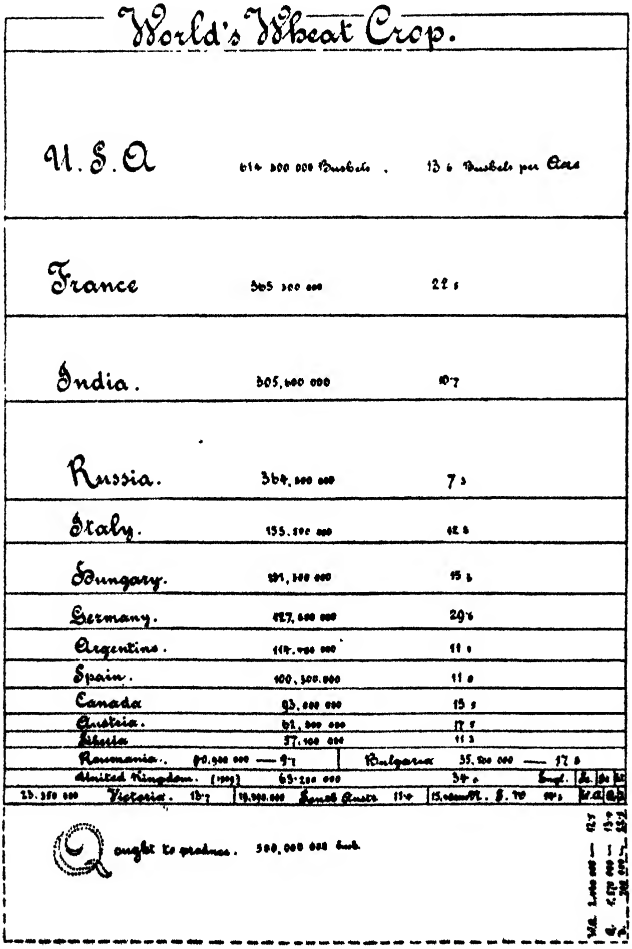
Professor Shelton, with his world-wide experience on wheat culture, estimated years ago the area of land suitable to wheat culture at about 50 millions of acres; at present Queensland cultivates altogether only about 850,000 acres, of which only 117,000 acres, or about 14 per cent., are under wheat. In consequence, Queensland, in spite of its enormous area of good agricultural lands, does not produce enough breadstuff for its requirements. On an average, a white population requires from 6 to 7 bushels of wheat per head annually; and, to show which countries produce wheat in sufficient quantities for export, and the others which require imports, I compiled a table showing the production of wheat per head of population, arranged in descending amounts, and we find that South Australia has by far the highest production of wheat in the world.

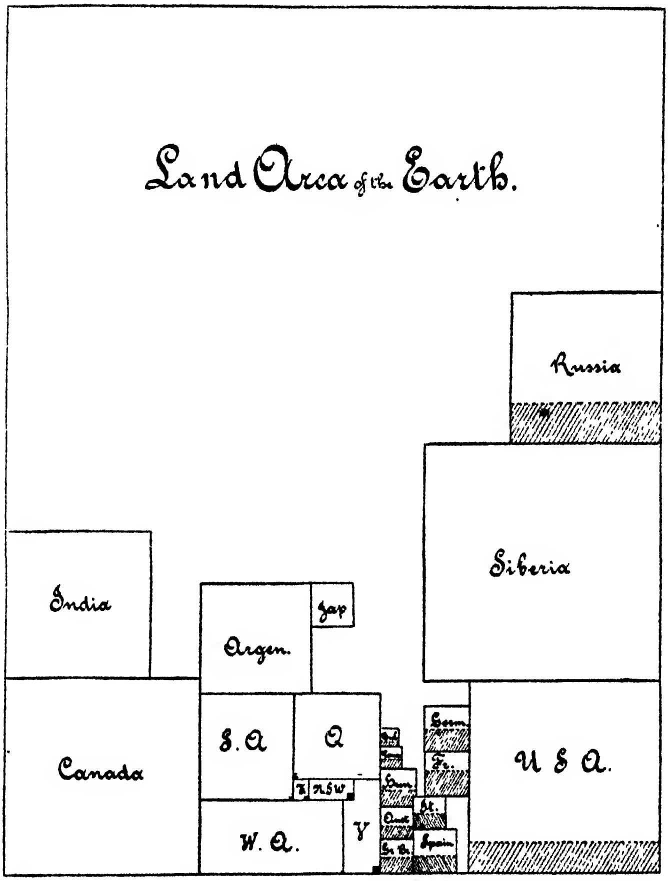
Wheat Production per Head of Population in Bushels.

South Australia	53.5
Argentine	22.9
Victoria	16.7
Commonwealth, Australia	15.7
Western Australia	13.1
Canada	12.3
New Zealand	11.5
New South Wales	11.0
France	9.4
Hungary	9.4
Bulgaria	9.3
United States	8.0
Roumania	6.8
Spain	5.5
Italy	4.8
Tasmania	4.1
Russia	3.3
Queensland	3.2

Austria	2.4
Siberia	2.3
Germany	2.2
United Kingdom	1.5
India	1.0

Last year the wheat production of the world amounted to about 2,600 million bushels, to which Australia contributed 63 million bushels, or about 2½ per cent. The United States of America are by far the biggest producers, with over 600 million bushels (23 per cent.); and to make the whole clearer, I give a graphic representation of the wheat yields, in which the area on the diagram is proportionate to the yield. On the diagram I also indicate the quantity which Queensland could produce if only half of the area available as wheat land would be cultivated. Another diagram shows the corresponding land area of the different countries of the world, and in some instances the actually cultivated areas are indicated by the shaded portions. In the Australian States the areas under cultivation are indicated by the small black squares, which only amount to a very small percentage of the area.





Cultivated Areas in Australia.

—	N.S W.	V.	Q.	S. A.	W. A.	T.	Commonwealth.
Million acres	2·72	3·46	0·54	2·32	0 59	0·27	9·89
Per Cent. of total area ...	1·37	6·16	0·13	0·40	0·09	1 61	0·52
Of which under wheat per cent.	51·3	51·4	1·5	72 9	48·6	10·8	53·2

The yield of wheat per acre varies very considerably in the different wheat-producing countries of the world. Netherlands is in the lead with over 38 bushels per acre, and it is particularly noticeable that the yield showed a steady increase during the last 60 years. We must note that in that country the yield of wheat in bushels per acre was as follows during the periods:—

1851-1860.	1891-1900.	1906-1908.	1909.
21.5	27.7	36.0	38.4

Belgium, New Zealand, and the United Kingdom come next with averages of over 34 bushels; most of the other yields are stated on the diagram of yields.

As already pointed out, the yield varies from season to season; but still in most of the European countries this variation is much smaller than out here. In the United Kingdom the lowest yield during the last 16 years was 26.3 bushels; the highest, 34.8 bushels; the average for 10 years being 31.5 bushels. Scotland's average is 41.2 bushels (varying between 36 and 42.5 bushels).

The keeping up of the yield and the increase of the acres put under wheat are of the utmost importance, as already at the present day the consumption is barely covered by the production, which was already predicted years ago by Professor Sylvanus P. Thompson.

The Agricultural Experiment Station of the University of Illinois addressed, last year, a circular letter to the leading agricultural investigators of Europe, to ascertain the causes of the large and steady increase in the yield of wheat and other cereal crops during the past century, and more particularly the relative proportion of the increase attributed to each of the following four factors—

(1.) To the use of improved seed;

(2.) To the use of plant food in commercial fertilisers and stable and green manure;

(3.) To better rotation of crops;

(4.) To more thorough tillage.

The answers to this circular were fairly unanimous, and may be summarised as follows:—

To the improvement of seed an increase of 10 to 15 per cent. may be attributed.

The largest part of the increase, estimated from 50 to 70 per cent., is due to the proper use of artificial fertilisers.

Thorough tillage and particularly deep cultivation are estimated to increase the yield from 15 to 30 per cent

Rotation of crops, in connection with throwing out of cultivation lands unsuitable for wheat culture, may be the cause of an increase from 10 to 12 per cent. in the average yield.

The increase in the actual yield, which amounts in many of the countries to an actual doubling of the crop, is therefore due to factors well known and as old as agriculture itself. The lessons learned from these facts should be extensively applied to our local conditions, and should help to arouse the interest of our wheat-growers to strive for a larger yield, general improvements in cultural methods, and lead to a considerable increase of the areas under cultivation.

In order to get some understanding of the bearing of the various factors on wheat culture, I shall now proceed to give a short outline of the composition of a wheat plant, and describe briefly "How a Wheat Crop Grows":—

A wheat plant consists of complex organic matter, which may be destroyed by burning, and of mineral matter left after burning in the form of an ash. Of the 80 odd elements, which are known to exist in Nature, only a small number—some 12 or 14—are found in a plant.

In the formation of organic or combustible matter, the elements Carbon, Oxygen, Hydrogen, Nitrogen, and traces of Sulphur and Phosphorus take part.

In the ash we find, besides small amounts of the last two elements already mentioned, other non-metallic elements Silicon, Chlorine, and the metallic elements Potassium, Sodium, Calcium (lime), Magnesium, Iron, and Aluminium.

The green wheat plant will contain from ¾ to 4/5 of its weight of water, which in wheat straw amounts only to about 1/7. Now, in the actual dry matter remaining, carbon forms about one-half by weight; oxygen, a little more than a third; nitrogen in the straw from ½ to 1 per cent., and in the grain from 2 to 3 per cent.; the ash in the straw amounting to about 5 to 6 per cent., and in the seed about 2 per cent. The composition of the ash of the straw and of the seed is totally different, the former containing about 70 per cent. of silica, the latter only about 2 to 5 per cent.; but we find only about 15 per cent. of potash in the ash of the straw, and about 30 per cent. in the ash of the seeds.

Now, let us ask,—Where does all the building material required in the growth come from?

The carbon, the principal constituent, is entirely obtained from the minute quantities found in our atmosphere. The air contains only about 3 parts of carbonic acid in 10,000 parts; or in a cubic yard of air, which weighs about 2¼ lb., we find only 7 grains of carbonic acid. All the absorption of the carbonic acid, and subsequent transformation into sugars and starch and tissue, is carried out by the leaves; and we can form some idea of the immensity of the work done when we consider that a crop of wheat collects during its growth in 3 or 4 months on an acre of ground over 2 tons of carbon from over 7 tons of carbonic acid.

The air enters into the leaves through the very small openings (stomata) found on the surface, and the actual change is carried on by the aid of sunlight absorbed by the green colouring matter (chlorophyll) in the leaf cells. The actual work done by the sun in the production of our crops is enormously large, and is estimated to be at least 3,000-horse power per day per acre, corresponding to the work of 15,000 men. During this assimilation free oxygen is given off by the leaves. The leaf openings also serve for transpiration or evaporation of part of the water absorbed by the roots and carried through the stem to the leaves. If the transpiration is too quick, the plant wilts; but the plant is able to control this evaporation to a large extent by a more or less closing of these openings.

The products of the carbon assimilation are the Carbohydrates—compounds formed, as the name implies, from Carbon and Water. Well-known carbohydrates thus formed at various periods of growth are—Sugars, Starch, and Cellulose. The carbohydrates, when consumed as foods by men or animals, produce heat.

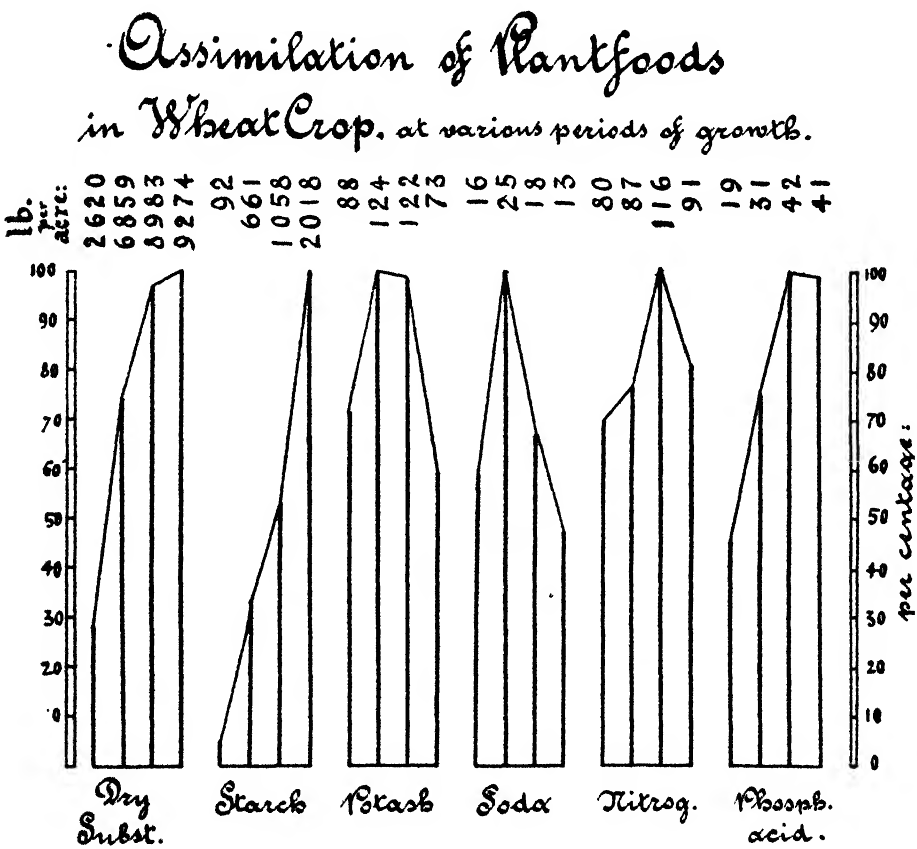
Of great importance are the organic nitrogen compounds—proteins or albuminoids—to which the wheat grain owes its value as one of the most nutritious cereals, and makes it particularly suited for the manufacture of bread.

An inexhaustible supply of nitrogen exists in the atmosphere, four-fifths being pure nitrogen; but it has always been hitherto accepted as a law that this atmospheric nitrogen is not directly available to higher plant life. Small amounts of nitrogen combine with the oxygen under the influence of electric discharges, and the compounds formed are collected by the rain water. The amount of nitrogen in form of soluble compounds thus collected in the soil amounts to 3 to 4 lb. per acre annually—a quantity quite insufficient to supply the needs of a wheat crop.

The soil, however, in each of its smallest particles, is alive with millions of bacteria; and some of these have the power to utilise and assimilate the atmospheric nitrogen, which then indirectly becomes available to the higher plants.

A few years ago Thomas Jamieson, the Director of the Aberdeen Agricultural Research Association, advanced the theory that certain minute hairs found on all plants can assimilate directly atmospheric nitrogen to produce proteins; and his theory has been confirmed by many European investigators, but has so far not been generally adopted.

The mineral constituents found in the wheat plant are all derived from the soil, and the amounts removed are very considerable. The most important of these plant foods are Potash and Phosphoric Acid, and also Lime; and it is the duty of every farmer to guard against the exhaustion of these compounds in their lands under cultivation.



Each constituent plays its own important part in plant nutrition; and if one is missing, even an abundance of the others would not produce a vigorous and healthy plant. This fact was first made known by Baron von Liebig, who formulated it as his Law of Minimum, in which he states that the fertility of a soil is governed by the minimum quantity of any of the essential mineral plant foods.

The plant itself utilises these mineral plant foods, which are absorbed by the aid of the roots in the production of organic compounds in the

leaves; and it was shown only a few years ago by Professor Wiefarth that the amounts of these mineral plant foods varied at different periods of growth, and that certain amounts of these substances were returned to the ground as the plant reached maturity. In the preceding diagram the amounts of plant foods in a spring wheat crop are shown at the age of 8½, 12, and 15 weeks after the appearance of the first leaves above the ground. We notice a rapid increase of total dry substance and of starch throughout the growth up to maturity. The amount of Potash reached its maximum at the 2nd stage, with 123.6 lb. per acre; and at the time of maturity only 72.8 lb. was found in the whole plant, so that 50 lb. were returned to the soil, after having done their share of work. With phosphoric acid the decrease was only very slight, and the actual amount removed by a fair crop of wheat amounts to about 40 lb. per acre, of which about 30 lb. is in the grain.

But not only the mineral plant foods are factors of growth, but of equal importance are light, heat, and moisture. The importance of moisture is well known to our wheat-growers, and the result of droughts is clearly indicated by poor crops; but the necessity of water will become more apparent when I state that for the production of every pound of dry substance in a crop from 300 to 400 lb. of water have to circulate through the plant, and that for the production of a wheat crop at least 1,000 tons of water, corresponding to 10 inches of rain, are required.

The conservation of rain water lies again largely in the hand of the farmer. A series of experiments, in which the amount of moisture in soil was determined at various depths and with various methods of cultivation, were carried out at the Roma State Farm, and show clearly how the Campbell system of dry culture and the system of bare fallowing, not only lead to a quicker absorption of any falling rain, but almost completely prevent any loss by evaporation.

This brings us to the importance of thorough cultivation, the want of which is largely the cause of small yields on some of our farms. Deep cultivation is also a necessity, and allows the roots to get deeper into the ground and draw on fresh supplies of mineral plant foods. Deep cultivation does not by any means necessitate the turning up of the soil and bringing the subsoil to the top, which in most cases would ruin any farm, but rather a stirring up of the subsoil and the breaking up of any pan which may form if the ground is always ploughed to the same depth for years. The continual breaking up of the surface soil, as long as the crop permits such working, will keep the soil cool, allows free entrance of air, prevents evaporation, hinders the growth of weeds, and will minimise the effects of adverse dry seasons.

I have not time to go now into the question of soils suitable for wheat culture, and can only briefly state that not only sufficient amounts of available plant foods must be present, but the soil must contain a fair amount of clay to give it a certain stiffness. There can be no doubt that most of the land at present under wheat is eminently suitable for wheat culture, and that very large areas quite as good are still available and will be utilised later on.

I have already stated that certain amounts of plant foods are removed by the wheat; and it will come as a bit of a surprise to our wheat-growers to learn that last year the crop of wheat of this State removed from the ground, in the grain alone, 300 tons of Potash, 500 tons of Phosphoric Acid, and 1,000 tons of Nitrogen, corresponding to about £114,000 worth of artificial fertilisers.

In South Australia 90 per cent. of the land is manured, and they use annually about 76,500 tons of fertilisers, with the greatest success.

We are here greatly handicapped in having to apply experiences gained elsewhere to our local conditions, as in manuring experiments only such trials which are carried on for a great number of years in each locality can be of any value.

In the celebrated English Experiment Station on Rothamsted, tests have been carried out continuously for 65 years, and in a block which has been kept permanently unmanured the average yield for 40 years was 14 bushels per acre, showing, however, a steady decline from year to year. Particularly remarkable are the results with continuous application of farmyard manure—14 tons per acre annually—the block yielding, as an average of 32 years, 33½ bushels of dressed grain. An almost equally good result was obtained with a complete artificial fertiliser, supplying every year 140 lb. of phosphate of lime, 100 lb. of potash, and 86 lb. of nitrogen in the form of ammonia salts; this plot yielding, as an average of 32 years, 32¾ bushels per acre.

The effects of nitrogenous manures are particularly striking, and nitrogen in the form of nitrates produced slightly more growth than when supplied in the form of ammonia salt.

As a rule, it is a well-known fact that wheat in general requires a nitrogenous manure to stimulate its growth, and that the plant is then quite able to get a sufficiency of phosphoric acid and potash. These laws apply unquestionably to wheat-growing in colder climates; but, with us, our climatic conditions modify them to some extent. Experience gained in our Sister States Victoria and South Australia, and extending now over a good number of years, show clearly that our wheat crops require generally a small application of phosphoric acid in a water soluble form, and slight dressings with, say, 30 to 60 lb. of superphosphate per acre in the plant drills may be justified, even if the soil in itself does not appear to be deficient in phosphoric acid. The small amount of phosphoric acid appears to stimulate an early and vigorous growth of the roots of the young seedling plants, so that they are enabled to reach quickly the cooler and moister layers of subsoil. A light application of a nitrogenous manure, in addition to the phosphatic fertiliser, also generally increases the yields; and in soils which have been under cultivation for a long period an addition of a small quantity of sulphate of potash may also be necessary in order to get maximum yields.

Very complete field experiments, in which the Agricultural Department co-operates with farmers, were instituted a few years back in Victoria by Dr. Howell, and more recently similar experiments have been started in New South Wales. In New South Wales, Farmers' Experiment Plots have been established in four divisions of the State; in each division from 15 to 20 farmers are carrying out such trials; and in most cases the experiments are made on half-acre plots. Varieties favoured by the farmers are grown side by side with varieties supplied by the Department; and a few of the trials are manured with light dressings of superphosphate, and superphosphate in combination with sulphate of potash.

The results, so far, showed distinct heavier yields of the departmental varieties as compared with the farmers' varieties; and the manured plots, with very few exceptions, gave increased yields, well paying for the increased expenditure. Finally, it may be stated that heavy applications of artificial fertilisers do not pay in wheat culture.

THE COTTON MARKET.

QUEENSLAND'S OPPORTUNITY.

As we anticipated, the price of cotton in the United States has risen until, in August, it reached the highest price since the American Civil War. In the beginning of the month the best price obtainable was 7·74d. per lb. for Uplands (short staple) cotton. By the end of the month it had risen to 10d. per lb. Whatever the reason for this rise in the cotton market, whether from a shortage in the crop, or owing to a "bull" clique cornering the market, the fact remains that there is more money in a cotton crop for the Queensland farmer than in wheat, maize, potatoes, and several other crops.

Compare the present values of maize and cotton. For the former, the grower is fortunate, during this prolific season, at all events, if he can get 2s. 4d. per bushel after all the labour he has had in cultivating, pulling, husking, threshing, &c. At present-day prices, a fair crop of maize will, at 60 bushels per acre, produce about £7; and from this there are many charges to be deducted (not reckoning the time taken to cart the produce to a railway station), such as bags, commission, freight, &c.

A crop of really good, prolific Uplands cotton should, under good climatic conditions, amount to from 1,500 to 2,000 lb. in the seed. With ginned cotton at 10d. per lb., the price of seed cotton should not be less than 2½d. per lb., returning from £15 12s. 6d. to £20 16s. 8d. per acre, from which have to be deducted the cost of cultivation and picking only, since the Brisbane buyers of seed cotton have been paying the freight themselves. Taking the picking at ½d. per lb., this item will amount to from £3 2s. 6d. to £4 3s. 4d., leaving a net return, less cost of cultivation, of £12 10s. to £16 13s. 4d. per acre. A reference to the returns of cotton crops from seed supplied by the Department of Agriculture and Stock to 100 farmers in 1905, as published in this Journal (Vol. XVI., Dec., 1905), will show that the cash return realised by them, when seed cotton was selling at 1½d. per lb., averaged £9 per acre, many obtaining £10, £11, and as high as £16 per acre. This was in the Lockyer and Fassifern districts, in the South. Even at 1½d. per lb. for seed cotton, the farmer's gross returns for such a crop as mentioned above would be respectively £9 7s. 6d. and £12 10s. per acre.

Queensland has, long ago, been proved to be eminently a cotton-growing country. In the Central districts especially is cotton at home; whilst for long-staple varieties, such as Sea Island and Caravonica, the Far North—say, from Mackay to Cooktown—cannot be excelled in any part of the world.

As regards picking cotton, it is often argued that cotton-growing cannot pay, since, owing to white labour conditions, all prospective profits would be swallowed up in the cost of picking. This is quite a misconception. If a man can earn 8s. and 9s. a day (which is the rate of pay for railway navvies) at the light work of cotton-picking, he has little cause to grumble. But can a man earn so much in the cotton-field? A fair picker in a full crop can pick from 200 to 250 lb. in a day of eight hours. An American cotton planter with whom we lately discussed the question of how much cotton a good, expert man could pick in a day, laughed at the idea of only 250 lb. as the result of a day's work. He said that the average for the pickers in the United States was 400 lb. daily, and he knew of one man who picked 800 lb. Now, allowing for this apparently exaggerated statement, we will take 250 lb. as a maximum, since this is the daily average of a planter in the Central district. At one half-penny per lb., the picker would earn 10s. 5d. per day. No reasonable white man could complain at such a wage for field work, and that such clean, light work as cotton-picking. Far harder is the work of the labourer on a dairy farm—work which never ceases from Sunday morning to Saturday night, nor on holidays; and the wages for this laborious work are not equal to those which can be earned by the cotton-picker. Even taking off inevitable stoppages, owing to wet weather, the pay is good; and as cotton-picking, in the Central and Southern districts, begins with the dry season, such interruptions are not frequent.

It was in the Central district, at Stanwell, that Mr. G. Sanderson, produced at the rate of 4,125 lb. of Tuskegee seed cotton (seed imported from Alabama, U.S.A.) and 2,250 lb. of Russell's Big Boll. This meant that, at the low price of 1½d. per lb., the cash return would be in the first case £25 11s. 7½d., and in the second £14 1s. 3d. Such returns as these are worth considering, especially now, when the season for sowing cotton has arrived. There now appears to be every prospect of a cotton famine, since the estimate of the American crop shows a shortage of no less than 200,000 bales of 500 lb. each.

If farmers were alive to their own interests, they would have a large share in supplying the deficiency, which means 100,000,000 lb. of lint or 300,000,000 lb. of seed cotton, worth, at 1½d. per lb., £1,875,000. There are nearly 50,000 persons engaged in agriculture and dairying in this State, and 846,885 acres under various farm crops. If only one-fifth of this area, or, say, 150,000 acres (about 3 acres per man), were devoted to cotton, Queensland could supply the American shortage, and the farmers would be the richer by nearly £2,000,000 from a crop which only occupies the ground for six months of the year.

Then, as to the question of labour, it must be remembered that the American planters have no longer any slave labour, nor even cheap coloured labour. The coloured labourers prefer other and more congenial fields of activity than ordinary farm labour, above which their advanced education has raised them; so that the American has little or no advantage over the Queensland grower. A large percentage of American cotton farmers have no coloured or cheap labour employed; but their superiority lies in their simple and methodical handling of the crop.

The Washington Department of Agriculture made the official statement that "first-class pickers can pick, by hand, an average of 500 lb. to 600 lb. of seed cotton per day. In 1894 a white picker was officially timed, and his average was 60 lb. per hour or 1 lb. per minute."

The following article, taken from the "Brisbane Courier" of 8th September, will show the urgent need of new fields of supply to save the Lancashire cotton industry from possible ruin:—

The Cotton Trade.

Sixty years ago Great Britain was declared to be the workshop of the world, and it was regarded as an impossibility for any country to compete with British manufacturers, Germany in particular being described as a poor country which would be outclassed in all future competition. At the beginning of the twentieth century it has been demonstrated that Germany is a long way ahead of Great Britain with respect to chemical manufactures; while with respect to steel and iron both Germany and the United States are still much further ahead in the open or restricted markets of the world. It was hardly anticipated, however, that the British cotton trade would be challenged by any other country; and yet, according to a paper read by Mr. Howard Reed, of Manchester, at the annual gathering of the British Association which is now being held at Sheffield, if cotton-growing within the Empire is not abundantly successful, within the next few years the Lancashire cotton industry will be doomed. The production of cotton in India and Egypt was inadequate to meet the increasing demands of the world, and financial or Government aid was declared to be urgent. Assistance of this kind has already been granted, but the general situation has not been greatly altered. The cotton trade is by far the largest and most successful manufacturing industry in Great Britain. Of the manufacturing articles exported, the immense proportion of one-third of the total is represented by the worked-up products of cotton. If all the manufactures of steel and iron in the United Kingdom be added together, and if all the machinery and ships be included, manufactures of wood and timber thrown in, it is declared by Mr. Benjamin

Kidd that the total would still fall short of the British export of the manufactures of cotton; and yet it is declared by a leading Manchester man that the Lancashire industry is in the immediate danger of being ruined. For three-quarters of a century (says Mr. Kidd), the leaders of the Lancashire cotton trade have been expounding to the nation a theory of international trade, but during all these years there has practically been no advance, although the demands for cotton goods have increased as well as the population of Great Britain—in fact, it has fallen from the proportion of one-third to the proportion of one-sixth of the total exports, while also changing so as to become more largely a trade in goods which, like yarn, embody only a small proportion of British labour. Surely, never was a hollower piece of absurdity imposed on the mind of a nation! If the great Lancashire cotton industry cannot stand the test of what is supposed to be the best economic system of the world, what chance have other British industries in the world's markets when competing with countries repudiating theories and giving attention to ordinary business considerations?

[We understand that a locally invented cotton-picking machine will be placed on the market during the next season.—Ed. "Q.A.J."]

FARMERS' NEW FRIENDS AND FOES.

Among the "new books" placed on the reference shelves in the British Museum Reading Room after the recent restoration, Mr. John Percival's "Agricultural Botany" may be noted as already showing signs of frequent use. It does not cover all the ground of Dr. Fream's "Elements of Agriculture," but is much fuller on its own particular side. Encouraged, doubtless, by the success of the botanical work, Mr. Percival has now attempted a volume, "Agricultural Bacteriology" (Duckworth, 7s. 6d. net), issued in *format* exactly corresponding, devoted to those new friends and foes of the farmer, the bacteria of the living organism, of the plant, and of the soil. These aids and hindrances, helps to development, sources of disease, have been with the vegetable and animal worlds from the beginning, but their detection was practically an event of the nineteenth century, and their systematic study in the twentieth is occupying with every year an increasing number of experts.

The author will make no enemies, for amid conflicting themes he advocates nothing overmuch. The fixation of free nitrogen by bacteria is discussed in a very temperate manner, but it is held that the practical utilisation of pure cultures of the nodule-forming organisms is still in the experimental stage. With respect to tuberculosis in cattle being capable of transmission to humanity, Mr. Percival ranges himself on the side of the Royal Commission, a corollary of which position in the advocacy of pasteurisation for both milk and cream. Diphtheria, if we follow him rightly, he does not hold to be transmitted by the cow; the milk that causes the disease to develop has, he thinks, in all cases been the subject of contamination from a human source. Septic sore throat, however, he inclines to believe may be directly transmitted. With regard to scarlet fever, he states frankly that we do not yet know enough to form any opinion worth recording.

The chapter on taints and defects in butter is important. It embodies much recent and instructive investigation and carries our knowledge of some "mysterious" troubles of the dairy to a point at which the "mystery" appears to be vanishing. What the author has to say on the turnipy flavour in butter so frequently complained of seems worthy of being reprinted in some widely circulated form such as a Board of Agriculture free leaflet. On several leading points in cheese-making Mr. Percival is stimulating by reason of outspoken agnosticism. He makes us feel at once that there is much learnable and yet to learn. Here, for example, are three lines on which investigation is invited. Many of the more complex protein substances have each a

characteristic taste and smell, but nothing definite is known about their influence in the production of good flavour and aroma in ripe cheese. Many of the peptones have a bitter taste; where this is removed by common salt it may be taken as showing that the cheese has ripened normally, but why this is so is not yet known. Russell and Babcock do not carry the author with them in their study of bacterial influences on the ripening of cheese, and he shows that a number of points remain to be cleared up by future investigators.

Mr. Percival has produced a valuable work of reference which will not easily be superseded. It is difficult to criticise as to style, for the author has in effect two styles. The best of these is very good indeed, and consists of such writing as we might get from taking down the talk of a man master of his subject explaining it conversationally to a friend of equal intelligence but less technical acquaintance with the matter. The other style is that of the laboratory demonstrator, and, despite a heavy reliance on the imperative, none too clear. It cannot be said that the two methods form a very good blend, but the book has probably been designed to serve two purposes—to give the advanced student something to read and think over, and to give the less advanced student something to do.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF AUGUST, 1910.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Average Test Per cent.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Glen	Shorthorn	21 July, 1910	1,002	4·6	51·86	
Honeycombe	,,	25 June ,,	1,041	4·2	48·97	
Lubra	Grade Jersey	17 Mar. ,,	675	5·0	38·11	
Remit	Holstein	8 July ,,	885	3·5	34·34	
Daisy	,,	29 Dec., 1909	796	3·6	31·84	
Cuckoo	Jersey	8 July, 1910	661	4·2	31·09	
Auntie	Ayrshire	8 Aug. ,,	790	3·5	30·66	
Ivy	Jersey	4 June ,,	603	4·5	30·20	
Orange	Grade Guernsey	13 Dec., 1909	517	5·1	29·79	
Nita	,, ,,	24 Jan., 1910	623	4·2	29·31	
Gem	Shorthorn	22 Jan. ,,	550	4·7	29·11	
Carrie	Jersey	26 Feb. ,,	598	4·2	28·12	
Mona	Grade Holstein	14 Aug. ,,	656	3·8	27·77	
Lemonade	Grade Guernsey	25 May ,,	559	4·4	27·61	First calf
Lady Sue	Grade Holstein	4 Apr. ,,	746	3·3	27·18	First calf
Comet	,, ,,	14 Nov., 1909	554	4·3	26·71	
Cocoa	Jersey	12 Sept. ,,	573	4·1	26·28	
Lorida	Ayrshire	26 Jan., 1910	529	4·2	24·88	
Tiny	Jersey	30 July ,,	555	4·0	24·80	
Eve	,,	1 Nov., 1909	438	5·0	24·72	
Burton's Lass	Shorthorn	14 Sept. ,,	438	4·8	23·69	First calf
Linda	Ayrshire	10 Apr., 1910	518	4·0	23·14	
Ethel	Grade Holstein	8 Oct., 1909	440	4·6	22·77	
Norma	Shorthorn	15 July, 1910	640	3·2	22·58	First calf
No. 6	,,	19 Nov., 1909	490	4·1	22·47	
Patsie	,,	29 June, 1910	594	3·4	22·35	First calf
Rosalie	Ayrshire	3 Jan. ,,	487	4·0	21·76	
Conceit	,,	22 Nov., 1909	439	4·4	21·68	
Dora	Shorthorn	29 Nov. ,,	[illegible]	4·1	21·28	
Bluebell	Jersey	29 Jan., 1910	350	5·4	21·16	First calf
Nancy	Shorthorn	10 Aug. ,,	586	3·2	20·67	
Rosepetal	,,	17 Apr. ,,	474	3·9	20·62	

Fed on 20 lb. green lucerne per diem and pastured on cultivation paddocks.

Poultry.

ROOSTING ACCOMMODATION FOR FOWLS.

Of the many details to be considered when constructing a poultry-house, not the least important is the provision of proper roosting accommodation.

Broadly speaking, fowls spend almost half their time on the perches, which, therefore, must have some effect on and be responsible to some extent for their general health and well-being; and, although it is quite as easy to provide and fix proper perches as it is to provide those of an unsuitable character, nothing costly or elaborate being necessary, it is surprising how frequently they are wrongly placed and fixed, and made of unsuitable material.

It is a mistake to use poles with the bark on for poultry perches, because, although the rough surface may afford a firm hold for the feet of the fowls, as the bark loses its greenness and dries it becomes loose, thus forming an open space between the bark and the wood, making one of the best and safest harbours for thousands of insects, which must irritate and disturb the fowls, especially at night, with detrimental effect.

Over-crowding on the perches is a thing to be avoided, and ample roosting accommodation for the number of fowls housed should be provided.

Perches should be quite smooth and of sufficient strength to prevent bending when occupied by fowls—say, 2 in or 3 in. square; and the sharp edges of the wood should be slightly rounded. All cracks, holes, and crevices in the wood should be stopped or filled up with thick lime or putty to prevent insects harbouring therein.

All perches should be fixed on the same level, and not, as frequently seen, stepped or ladder-shaped—that is, the front perch fixed at the lowest level and each succeeding one a little higher. Ladder-shaped perches cause fighting at roosting time, as all the birds strive to reach the topmost perch, especially if the cock is there, and injury is likely to be caused to the birds below by those above flying on and off.

There is no advantage to be gained by fixing perches a great height above the floor of the poultry-house; in fact, there are several disadvantages. Leg weakness, corns, bumble foot, and other lameness can often be traced to high perches, because in descending the birds, especially heavy breeds, drop with considerable weight, and are likely to force pieces of sharp grit and other substances into their feet, as well as strain themselves.

To some extent the height at which perches should be fixed depends upon the fowls to be kept, but in houses of small size they must always be kept low, or the birds will be cramped for flying space, and probably injure themselves in descending.

Perches fixed about 12 in. from the floor are suitable for large, heavy birds, and from 18 in. to 24 in. for lighter breeds. They should be placed as far away from the door of the house as possible, and at least 1 ft. apart, so that birds on different roosts do not touch one another.

It is highly important that all perches should be movable, and at the same time firmly fixed, and not easily displaced; and when they have to be placed over nest boxes, a wooden shelf or dropping-board must intervene between the two to keep the nests perfectly clean and free from droppings.

The best and simplest way of fixing movable perches is to screw substantial wooden slotted brackets to the sides of the house at a suitable height

and distance apart, the same being previously soaked in creosote or paraffin to prevent the accumulation of insects at these points. The ends of the perches fit into the slots and can be instantly removed when necessary.

The main object in having the perches movable is so that they can be easily and thoroughly cleaned, and all parts, corners, and crevices thoroughly disinfected to prevent the harbourage of vermin. The perches should be frequently scraped and coated entirely with paraffin; whilst the sockets should be periodically painted with a mixture of tar and paraffin.

Chickens do not require perches until they are about four months old; in fact, they are far better without, as early perching often causes crooked breasts.

The Horse.

THE SUFFOLK STALLION FOR CROSS-BREEDING.

A correspondent of the *Nor' West Farmer*, Canada, writes concerning the Suffolk stallion:—" I do not think there is a better heavy horse than the Suffolk in the world for crossing on all types of mares. To-day we find the leading breeders in England and Ireland crossing their purebred Shires, Clydes, Hackneys, and thoroughbred mares with Suffolk stallions. The same Suffolk stallions have travelled the same districts in Ireland for sixteen years, and others over ten years. This illustrates that the cross is all right, as otherwise I doubt very much whether a stallion could travel one season, let alone sixteen, in a country like Ireland, which is noted for its horsemen. The Irish breeders say: ' The use of the Suffolk horse with the small light mares of the south of Ireland has been found to impart strength and substance to their progeny, without impairing their powers of endurance and tough constitutions. The results of this cross are kind workers equal to a ton weight in draught on country roads, and can trot 10 miles an hour in harness.' For a second cross I would recommend a Suffolk for the heavy fillies. Any that had a dash of thoroughbred on their dam's side I would breed back to a good thoroughbred, and thus follow the example of the Irish and Australian breeders, who have proved beyond a doubt that this second cross produces more heavy-weight-carrying hunters than any other combination. As regards weight of stallion for this class of mares, I would advise one of the lighter ones, say between 1,700 lb. and 1,800 lb."

AUSTRALIAN HORSES FOR INDIA.

An officer of the Police Department of India has paid a visit to Australia for the purpose of investigating the horse markets there with a view of obtaining animals at lower prices. It would appear that, while Australian horses are preferred in India to those of other countries, the prices in Calcutta are deemed unnecessarily high, and that unless such horses can be purchased cheaper the trade is likely to go to America and South Africa. It is stated by the officer referred to that if some system of breeding, especially for the Indian market, were adopted in Australia an immense trade in police horses, pleasure hacks, and polo ponies could be developed, and a great boon conferred upon civil and military officers and others whose duties and pleasures require them to keep and use horses constantly. An officer of the Remount Department of the Netherlands, accompanied by a veterinary surgeon, is also visiting Australia for the purpose of ascertaining whether Australian horses are suitable to the requirements of the Netherlands Army for remounts.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order RANUNCULACEÆ.

RANUNCULUS, Linn.

R. muricatus, *Linn.* An erect or diffuse, glabrous or rarely hairy annual, about 1 ft. high. Leaves 1 to 2 in. diam., 3-lobed, irregularly cut, base rounded or cordate, the upper ones cuneate. Flowers 4 to 6 lines diam., solitary and leaf opposed, or terminal and paniculate. Sepals reflexed, rather shorter than the petals. Achenes in a rather large globose head, oval flattened tuberculate or spinous, rarely smooth, tubercles scattered over the flattened sides or confined to near the intramarginal rib; beak straight, compressed, ribbed, tip hooked.

Hab.: Europe, Western Asia, and temperate North America; now becoming naturalised about Toowoomba, *H. A. Longman.*

Order LEGUMINOSÆ.

SWAINSONA, Salisb.

S. canescens, *F. v. M.* Stock woody, with erect, rigid, but herbaceous stems of 1 to 2 ft., softly tomentose-pubescent. Leaflets 9 to 15, obovate or oblong-elliptical, obtuse or retuse, ½ to 1 in. long, nearly glabrous above, softly pubescent or silky underneath. Stipules broad, herbaceous. Racemes many-flowered, on long silky-villous peduncles. Flowers nearly sessile, blue or violet-purple, variegated with pink, and a green blotch at the base of the standard. Calyx about 2½ lines long, silky hairy, the lobes about as long as the tube. Standard about ½ in. diam. on a very short claw, without prominent callosities; wings short, keel much curved, obtuse, with a thick callous appendage on each side of the tip. Ovary shortly stipitate; style much curved, involute at the end. Pod almost sessile, oblong, very softly tomentose-villous, about 8 lines long, rather coriaceous, with an indented upper suture. *Cyclogyne canescens,* Benth.

Hab.: Western Queensland, *J. Little.*

Order CHENOPODIACEÆ.

Atriplex semibaccata, *R. Br.;* **forma tenuis,** *Bail., new form.* Plant hoary, slender, nearly erect. Leaves entire. Fruit smaller than in the common form.

Hab.: Windorah, *Walter H. Rose.*

Order ORCHIDEÆ.

PTEROSTYLIS, R. Br.

P. Daintreana, *F. v. M.* The leafy steam bearing 4 to 5 leaves scarcely forming a rosette, about 1 in. above and 1 in. below the surface of the soil. Tubers flattish-globular, about 4 lines diam., white. Leaves ovate, 4 to 5 lines long, 4 to 5 lines broad on petioles of same length.

Scape slender, about 6 in. high, with 3 empty sheathing bracts, like the bracts subtending the pedicels, produced into fine points. Flowers 2 to 4, distant, nearly the size of but much more slender than those of *P. parviflora*. Galea 3 to 3½ lines long, obtusely hood-shaped, produced in front into a long fine point; lower lip narrow; the entire part about 1 line long, the lobes narrow, produced into long fine points embracing the galea. Labellum narrow, obtuse, and entire at the end, sagittate at the base with obtuse auricles and a small obtuse entire appendage between them. Column reaching to the end of the galea, the wings very broad with a small point at the upper front angle, the lower slender portion of the column bordered by narrow wings; the stigma scarcely prominent.—Mostly from *Fl. Austr.*, vi. 360.

Hab.: Ipswich, *T. F. Hall.*

Order GRAMINEÆ.

POLYPOGON.

P. monspeliensis, *Desf.*, **var. Rosei.** *Bail.*, *new var.* A densely tufted slender grass, about 6 in. high, shortly geniculate at the base, leafy throughout, nodes black or brown. Leaves narrow—linear—lanceolate, 1 to 1½ in. long, erect. Ligula oblong prominent. Inflorescence spike-like, 1 to 1½ in. long, 1½ to 2 lines diam. Awns about the length of the glumes, very delicate, erect or slightly spreading.

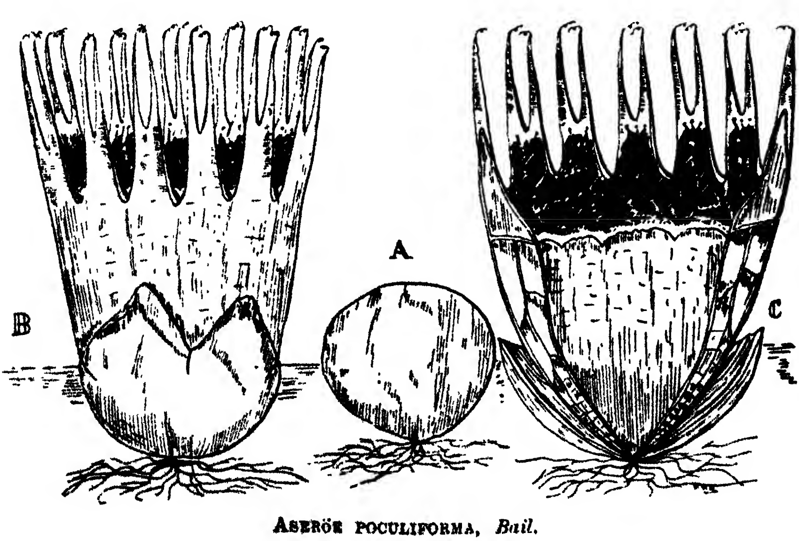
Hab.: Windorah, *Walter H. Rose.*

Order FUNGI.

Family Phalloidei.

ASERÖE, Labill.

A. poculiforma, *Bail. sp. nov.* (Plate No. —). Volva about 1½ in. high, 1¾ in. broad, or nearly globose, more or less purplish, bursting at the top into irregular broadish lobes. Mycelium much branched, purplish. Receptacle goblet-shaped, about 1¾ in. diam. at the base and 2¾ in. at the



Aseröe poculiforma, *Bail.*
(About half natural size)
A, Young plant. B, Mature plant. C, Section.

mouth, the walls hollow, pale pink outside, the mouth bordered by 11 erect bifurcate lobes 1½ in. high, the entire portion usually short, the branches tapering to threadlike curled ends. Inside, at the base of the lobes or top of the goblet, is a thin red horizontal expansion which seems as if it had, in an earlier stage of growth, formed a cover to the goblet; and on a portion of this, and the entire portion of the lobes which bear short tuberculose spines, rests the dark-coloured sporiferous pulp. All the named species of this beautiful genus run the one into another; thus it is scarcely safe to name a fresh species. The present, however, differs in shape of receptacle and direction of the lobes.

Hab.: Toowong, *Miss M. Gregory*.

HYPHOMYCETEÆ.

STERIGMATOCYSTIS (Vicert.). Sacc. Syll. Fung. iv. 71.

Sterile hyphæ creeping, fertile erect simple; apex vesiculose. Conidia basidia verticillately branched, mostly globular.

S. nigra (*Tiegh.*), Sacc. Syll. Fung. iv. 75; **Aspergillus niger**, Tiegh. Fertile hyphæ erect, 800 to 1,000 by 11 to 16 μ, thick truncate, hyaline or subvesiculose, globose, soft dark; mycelium hypæ slenderish; capitulum subglobose and blackish-brown; basidia 40 μ long, radiating; sterigmata 8-0 μ long obclavate; conidia globose, 3, 4-4, 5 thinnish verruculose and violet-brown; catenulate.

Hab.: A black mould on leaves and fruit of *Citrus Garrawayi*, Mount White, Coen, *Jas. Whiteford*.

The following are a few additions to the Queensland Algæ, determined for me by A. D. Cotton, of Kew, England:—

FAMILY CLADOPHORACEÆ.

Cladophora glomerata (*Linn.*) *Kuetz.*

Hab.: Brisbane River, *C. T. White*.

FAMILY DASYCLADIACEÆ.

Halicoryne Wrightii, *Harv.*

Hab.: Dunk Island, *E. J. Banfield*.

FAMILY DICTYOTACEÆ.

Zonaria (Draparn), *Ag.;* **crenata,** *J. A.*

Hab.: Moreton Bay, *J. H. Simmonds*.

Dictyota nigricans, *J. A.*

Hab.: Caloundra, *R. A. Bulcock*.

FAMILY STILOPHORACEÆ.

Stilophora rhizodes (Ehrb.), *J. Ag.*

Hab.: Moreton Bay, *J. H. Simmonds*.

FAMILY MELANTHALIEÆ.

Curdiea laciniata, *Harv.*

Hab.: Rockingham Bay, *Howard Newport*.

Tropical Industries.

ABACA FIBRE.

Abacá is the name given in the Philippine Islands to the *Musa textilis*, an indigenous plant of the banana family, from which the Manila hemp of commerce is extracted. Even the fruiting varieties of banana contain a large amount of useful fibre which is not utilised, owing principally to the want of means for profitably extracting it. There have been machines invented for the purpose in the Philippines, but still the extraction of fibre is mostly done by the aid of the primitive native appliance, which demands severe hand labour. The United States Fibre Expert, Mr. M. M. Saleeby, in a paper published in the "Philippine Agricultural Review" (June, 1910), gives interesting information as to the stalk formation of the abacá, in which the fibre is contained in a very different manner to its disposition in the leaves of the sisal plant:—

Stalk Formation.

The abacá stalk consists of a fleshy central core and a number of overlapping sheaths. This core is a continuation of the fleshy part of the rootstock, and, as it grows, sheaths are formed on its sides at irregular intervals. When the stalk reaches maturity sheath formation stops; but the core keeps growing and forms what is known as the "flower spike." The central core, therefore, is really the flower stalk, and its sheaths are the petioles of the leaves. This core diminishes in diameter as it rises in the middle of the stalk. Its diameter at the base of the stalk varies from 15 to 35 centimetres, and at the top it rarely exceeds 4 centimetres.

The sheaths are of a crescent shape, and are so tightly laid one upon the other as to form one solid mass. They overlap in such a way as to have one of their lateral sides under the preceding sheath and the other above the succeeding one. These sheaths are thickest at the middle and at the base, and diminish gradually toward the lateral edges and toward the top. The width of these sheaths also varies; the fourth, fifth, sixth, and the seventh are usually the widest and thickest. Both the thickness and width depend on the position of the sheath, and range from 1¾ to 2¼ centimetres and 15 to 25 centimetres in the exterior sheaths to 7 millimetres and 8 to 10 centimetres in the interior sheaths, respectively.

The stalk consists of 16 to 25 sheaths, depending on the variety and extent of growth. None of the sheaths are exactly the same length as the stalk. The exterior sheaths rise from the base of the core, but do not extend to the top of the stalk; and the interior ones, which extend to the top, do not rise from the base, but at variable intervals above it. The sixth, seventh, and eighth sheaths are usually the longest, varying from 2½ to 5½ metres.

A look at a cross section of the sheath shows that it consists of three distinct though not well-defined layers. The outside layer is a fibrous ribbon that contains most and the strongest of the fibre, and is about 4 to 5 millimetres thick. The middle layer consists, for the most part, of a row of cavities separated by longitudinal and transverse partitions or walls. The longitudinal walls contain few fine and white fibres that are weak, but the tranverse walls are thin, fibreless, transparent membranes. The third layer is a mass of useless, fibreless tissue, its width rarely exceeding 2 or 3 millimetres.

The outside layer is the one that the strippers separate in three or four strips in the first process of fibre extraction. During the process of separating these strips a part of the fibre in them remains attached to the lower layer; and also, when these are pulled under the knife, some more fibre is wasted, of

which large quantities can be seen piled in heaps in front of every stripping-shed. It is estimated that 30 per cent. or more of the fibre of this layer is wasted during the two processes of extracting the fibre.

The fibre found in the longitudinal walls of the cavities of the middle layer as well as the fibre found immediately above is, as mentioned above, both rare and weak. Rope manufacturers object to its presence in the fibre obtained from the upper layer, because, during the operation of stretching and twisting, this fibre breaks and collects in a sort of a knob known as "tow spot." It is on account of this fact also that the manufacturers refuse to buy the fibre extracted by machines that save this weak fibre.

DESCRIPTION OF THE FIBRE.

Abacá fibre is very light, strong, and of good tenacity. When properly extracted and dried, it is also of a white, shining colour. It divides easily into smaller fibres of a regular diameter. Running through its length is a central cavity which is both large and apparent. The walls of this cavity are of uniform thickness, and its form resembles the form of the whole fibre, which is in most cases oval. The end of the fibre tapers gradually, and the point is acicular or slightly rounded.

CLASSIFICATION OF THE FIBRE.

Softness, colour, and strength are the qualities usually considered in grading the fibre. The degree of softness, colour, and strength is affected by soil and climatic conditions, by the variety cultivated, by the position of the sheath in the stalk, and by the manner of extracting, drying, and handling the fibre. In the same soil and climate, and in the same variety, the extent of growth affects the quality of the fibre. The larger stalks contain a coarser, darker, and stronger fibre than that found in the smaller ones.

The fibre increases in softness and whiteness, but decreases in strength, from the outside sheaths toward the inner ones, those around the core being the softest, whitest, and weakest. After every four or five sheaths we invariably find a noticeable change in the quality of the fibre. Given from 16 to 25 sheaths to the stalk, the position of the sheaths will, in itself, be responsible for only four or five grades. But, owing to the imperfect method of extracting the fibre and the lack of care in drying and handling it, we find as many as 17 grades, the lowest five or six of which have no reason to exist.

The following are the standard grades of abacá fibre as known in the American and European markets:—

Best Marks or F.E.A. Quality.

(1) 300 per cent. over good current.
(2) 250 per cent. over good current.
(3) 200 per cent. over good current.

Good Marks or F.E.B. Quality.

(4) 150 per cent. over good current.
(5) 100 per cent. over good current.
(6) 50 per cent. over good current.

Middle Marks or Grades.

(7) Good current.
(8) 75 per cent. over fair current.
(9) Midway.
(10) 25 per cent. over fair current.
(11) Fair current.

Low Marks or Grades.

(12) Superior seconds.
(13) Good seconds.
(14) Fair seconds.
(15) Good red (brown).
(16) Fair red (brown).
(17) Daet current.
(18) Strings.

Conclusion.

The principal differences existing among the different varieties of abacá, such as the size of the stalks, the percentage of fibre, and the percentage of each grade in each variety, is clearly shown in the following table. The data contained in these tables were collected from a series of experiments made in different localities in the Davao district. The number of stalks used is three of each variety; and the grading was made by the expert of Messrs. Smith, Bell, and Co.

All operations were made by the ordinary native method and under ordinary conditions. The size of the stalks is above the medium in the majority of the varieties, but, other than that, there is no reason whatever why every planter should not obtain the same results, especially in the quality of the fibre produced:—

TABLE No. I.

Names of Varieties	Total Weight of Stalks	Average Weight of One Stalk.	Average Length of Stalk	Average Circumference at Base.	Average Circumference at Top.	Weight of Dry Fibre	Percentage of Fibre
	Kilos.	Kilos.	Metres	Cm	Cm	Kilos.	
Tangongon .	266	88·67	5	84	40	6·89	2 6
Bangulanon	100·5	33·50	3·8	59	33	2·34	2·3
Maguindanao . ..	259 5	86·50	4·6	84	36	4·40	1 7
Libuton	218·1	72 70	4 3	84	41	3 73	1 7
Arupan	209	69 70	3 9	79	46	3 78	1 8
Puteean . ..	190	63·30	4·1	71	36	3·42	1·8
Sinaba .	186	62	4·2	72	43	2 52	1 3
Baguisanon Lawan ..	318	106	5 4	87	41	4·53	1·4
Agutay	119·5	39·80	3·8	65	35	1·80	1·5

TABLE No. II.

Names of Varieties.	Best Marks or F. E. A. Quality.		Good Marks or F. E. B. Quality.		Middle Marks.		Low Marks.	
	Kilos	Per cent.	Kilos.	Per cent.	Kilos.	Per cent.	Kilos.	Per cent.
Tangongon	1·700	24 75	3 525	50·50	1 6[illegible]0	24·25	..	.
Bangulanon	1·200	50 75	·960	41 25	·180	8 01	...	...
Maguindanao ...	2 325	52 50	1·800	41 00	·275	6·25	...	..
Libuton	1 065	29 00	1·700	45·75	·715	18·50	0·250	6 7
Arupan	1·513	3[illegible]·50	1·675	44·50	·590	16 00	...	..
Puteean	2·520	72·50	·540	16 75	360	10 75	...	...
Sinaba*	1·200	47·00	1 200	48	125	5 00	...	...
Baguisanon Lawan	2·290	50·[illegible]0	1 790	39 50	·450	10·50	...	..
Agutay	·775	43 00	·700	39·50	·325	17 50	...	...

* The percentage of the highest grade of fibre in this variety should be much higher than it is. The sample accidentally got wet prior to grading.

APPROXIMATE WEIGHT AND STRENGTH OF MANILA ROPE.*

Diameter in Inches.	Circumference, in Inches.	No. of Feet in 1 pound.	Length of Coil, in Fathoms.	Weight of Coil, in Pounds.	Working Strength Estimated in Pounds—Not Guaranteed.
...	†	160	1,800	70	250
...	‡	90	1,000	70	375
...	§	66	720	70	430
3/16	‖	92	400	25	425
1/4	¶	51	400	50	500
5/16	**	35	300	50	800
3/8	††	24	200	50	1,000
7/16	1¼	18	200	65	1,200
1/2	1½	11·6	135	70	1,680
9/16	1¾	10	135	80	1,920
5/8	2	8·1	135	100	2,400
3/4	2¼	6·8	135	120	2,880
13/16	2½	5·5	135	150	3,600
7/8	2¾	4·9	135	190	4,560
1	3	3·6	125	205	5,100
1 1/16	3¼	3·1	125	240	6,000
1⅛	3½	2·7	125	276	6,900
1¼	3¾	2·3	125	324	8,100
1 5/16	4	2	125	372	9,300
1 7/16	4¼	1·8	125	408	10,200
1½	4½	1·6	125	456	11,400
1 9/16	4¾	1·4	125	516	12,900
1⅝	5	1·3	125	576	14,400
1¾	5¼	1·2	125	636	15,900
1⅞	5½	1·1	125	696	17,400
1 15/16	5¾	1	125	756	18,900
2	6	·9	125	830	20,700
2⅛	6½	·71	125	972	23,700
2¼	7	·68	125	1,140	27,900
2½	7½	·60	125	1,275	32,100
3⅝	8	·51	125	1,500	36,900
2⅞	8½	·45	125	1,700	41,700
3	9	·40	125	1,930	47,100
3⅛	9½	·36	125	2,150	52,500
3¼	10	·32	125	2,400	58 500
3⅜	10½	·30	125	2,600	64 500
3½	11	·27	125	2,900	70 800
3⅞	11½	·24	125	3,150	77,400
4	12	·22	125	3,400	84,600
4 1/16	12½	·20	125	3,700	91,800
4¼	13	·19	125	4,000	99,000
4⅜	13½	·18	125	4,400	107,400
4⅝	14	·16	125	4 700	115,800
4 15/16	14½	·14	125	5,000	124,200
5	15	·13	125	5,400	132,600

† 2-thread bale. ‡ 3-thread bale. § 4-thread bale. ‖ 6-thread fine. ¶ 6-thread. ** 9-thread. †† 12 thread.

The working strength is estimated at 100 lb. to the thread, in a new rope; breaking strain, 50 per cent. more.

* This table was taken from the Portland Cordage Company's Catalogue No. 5, page 9.

SYNTHETIC RUBBER AGAIN.

A writer in the London "Financial Review of Reviews" says that "quite recently one of the great German aniline dye concerns, employing some 7,000 workpeople, and having a capital of over £2,500,000, submitted to a German chemist samples of rubber which they had manufactured by a secret process, with the request that he would test them in every way. He applied the most stringent tests, and established beyond a doubt that these samples were in every way identical with natural rubber. Continuing his experiments and starting from isoprene as a base, finding that natural rubber dissolves when heated with glacial acetic acid, he treated isoprene (derived from turpentine oil), and, observing certain conditions with the same substance, ascertained that rubber could be produced in this way. The artificial rubber is as elastic as the natural product, and is of a brownish-white colour. It appears to be an established fact that the problem of manufacturing synthetic rubber has

been solved. Of course, it is not intended to imply that the death-knell of natural rubber has been sounded, and some time will necessarily elapse before the artificial product is likely to flood the world's markets.

[We have no doubt that a substitute for natural rubber will eventually be discovered, just as in the case of indigo and camphor; but the vital question will be: "At what price?" Should rubber fall to 3s. per lb., it will still leave a large profit to the growers of plantation rubber, whose only expense on an established plantation of seven-year-old rubber-trees will be the collection of the latex, which in cheap labour countries can be done at a cost of from 1s. to 1s. 3d. per lb.—[Ed. "Q.A.J."]

SISAL *v.* MAURITIUS HEMP.

For the last few months the weekly fibre market reports issued in Europe show a decided preference amongst buyers of fibres for Mauritius hemp, which is the product of the Fourcroya or Furcrea plant, over Sisal fibre. The latest September returns give the price of Sisal at from £23 to £23 5s., and of Furcrea fibre at £26 to £27 5s. per ton. We have frequently advised sisal planters to add Mauritius hemp to their plantations, but without effect. There are many advantages which this plant has over sisal. It comes to maturity much sooner; it is easier to handle than sisal. In length it attains as much as 9 ft. here in less time than sisal takes to reach 6 ft. Consequently there is far more fibre in a Furcrea leaf than in a Sisal leaf. Even in leaves of equal length, the fibre content of the Furcrea is greater. The latter is softer, and hence more easily cleaned in the machine than the former. The fibre is not so strong nor so silvery-looking as that of the sisal; but it is much finer, and can be used for purposes for which the coarser, stronger sisal fibre is unsuited.

Times of Sunrise and Sunset at Brisbane, 1910.

Date.	September.		October.		November.		December.	
	Rises	Sets.	Rises.	Sets	Rises.	Sets	Rises.	Sets.
1	6·3	5·33	5·29	5·47	4 58	6 5	4 46	6 28
2	6·2	5 34	5·28	5 48	4 58	6 6	4·46	6·28
3	6 1	5·34	5 27	5 48	4 57	6·7	4·46	6·29
4	6 0	5 35	5 26	5·49	4·56	6 7	4 46	6·30
5	5·59	5 35	5·25	5·49	4 56	6 8	4·46	6 31
6	5·58	5 36	5·24	5 50	4·55	6 9	4 46	6·31
7	5·57	5·36	5 23	5·50	4·54	6 9	4 46	6 32
8	5·56	5·37	5·21	5·50	4 54	6 10	4·46	6 33
9	5·54	5 37	5·20	5·51	4 53	6·11	4·46	6 33
10	5·53	5 37	5·19	5 52	4 52	6 11	4 47	6 34
11	5 52	5·38	5·18	5·52	4·52	6 12	4 47	6·35
12	5 51	5·38	5·17	5·53	4 51	6 13	4·47	6 36
13	5·50	5 39	5·16	5·53	4 51	6 14	4·47	6 36
14	5 49	5·39	5·15	5·54	4·50	6·14	4 48	6·37
15	5·48	5 40	5·14	5 54	4 50	6 15	4·48	6·37
16	5·46	5·40	5·13	5 55	4·49	6 16	4 48	6 38
17	5·45	5·41	5·12	5 56	4 49	6 17	4·48	6 39
18	5·44	5·42	5·11	5 56	4 49	6 18	4 49	6·39
19	5·43	5 42	5 10	5·57	4 48	6 18	4 49	6·40
20	5·42	5 42	5 9	5·57	4 48	6 19	4 50	6 40
21	5·41	5·42	5 8	5·58	4·47	6 20	4 50	6 41
22	5·40	5 43	5 7	5·58	4·47	6 21	4 51	6 42
23	5·38	5·43	5 6	5 59	4·47	6 22	4 51	6·42
24	5·37	5·44	5·5	6 0	4·47	6 22	4 52	6·43
25	5·36	5 44	5 4	6·0	4 47	6 23	4·52	6·43
26	5·35	5 45	5 4	6 1	4·46	6·24	4·53	6·43
27	5·34	5·45	5·3	6·2	4 46	6 25	4·53	6·44
28	5·33	5·46	5 2	6·2	4 46	6 25	4·54	6·44
29	5·32	5 46	5 1	6·3	4·46	6·26	4·54	6·44
30	5·30	5·47	5 0	6·4	4·46	6 27	4·55	6·45
31	...	...	4·59	6·5	...	...	4·56	6·45

PHASES OF THE MOON.

			H. M.
4 Sept.	●	New Moon	4 6 a.m.
12 „	☾	First Quarter	6 11 „
19 „	○	Full Moon	2 52 p.m.
26 „	☽	Last Quarter	6 54 a.m.
3 Oct.	●	New Moon	6 32 p.m.
11 „	☾	First Quarter	11 40 „
19 „	○	Full Moon	0 24 a.m.
25 „	☽	Last Quarter	3 48 p.m.
2 Nov.	●	New Moon	11 56 a.m.
10 „	☾	First Quarter	3 29 p.m.
17 „	○	Full Moon	10 25 a.m.
24 „	☽	Last Quarter	4 13 „
2 Dec.	●	New Moon	7 11 a.m.
10 „	☾	First Quarter	5 5 „
16 „	○	Full Moon	9 5 p.m.
23 „	☽	Last Quarter	8 36 „

Chemistry.

ANALYSES OF FERTILISERS.

By J. C. BRÜNNICH, Chemist to the Department of Agriculture and Stock.

Since the introduction of the "*Fertilisers Act of* 1905" it has been customary to check the composition of all our commercial fertilisers by getting our inspectors to collect once or twice a year samples from all dealers, and to have these samples analysed at our Agricultural Laboratory.

A complete list of these **analyses** carried out recently is herewith published for the information of farmers.

In accordance with the Act, every dealer, manufacturer, importer, or agent who deals in fertilisers for the purposes of trade is required to register each year, giving the names or brands of fertilisers dealt in by him. We have now fifty-two registered dealers in our State. Upon the sale of any fertiliser the seller must supply to the buyer an **invoice certificate,** signed by the seller or his agent, stating full name and place of business of the seller, trade mark, brand, or other sign used to identify such fertiliser: quantity of the fertiliser or net weight in lb.; and the composition of the fertiliser, giving the respective amounts of nitrogen, phosphoric acid, and potash contained therein. Such a certificate can be attached in form of a label to each bag or package, or it may be supplied separately in form of printed slips, but the **bag must be distinctly branded** with the number of net pounds of fertiliser in the bag or package, and the figure, trade mark, or sign under which the fertiliser is sold.

The latitude allowed under the Act, in any **deficiency** in the composition, in order to allow for slight variations in manufacture, is a fairly liberal one, amounting to 5 per cent. of the total nitrogen or of potash certified to be present, if the fertiliser contains not less than 10 per cent. of nitrogen or potash, and 7 per centum of the total phosphoric acid certified to be present, if the contents of phosphoric acid are not under 15 per cent. In the case of fertilisers containing smaller amounts of fertilising ingredients, less than 10 per cent of nitrogen or potash, and less than 15 per cent. of phosphoric acid, the amounts of deficiency allowed are—nitrogen and potash ½ per cent., and phosphoric acid 1 per cent.

On the whole, it may be stated that the composition of the fertilisers agrees fairly well with the guaranteed amounts, which, for this reason, are not given on the table.

Hitherto great confusion has existed through stating the composition of fertilisers in various ways, giving, for instance, phosphoric acid as bone phosphate, tricalcic phosphate; nitrogen as ammonia and ammonium sulphate; potash as potassium sulphate and potassium chloride, &c. All such statements only mislead the farmer, and to avoid this, the Act provides for the statement of the valuable fertilising ingredients in percentage amounts of **nitrogen** (N), **potash** (K_2O), **and phosphoric acid** (P_2O_5).

The conversion of the amount of one compound into another is very simple, and as many manuring formulæ contain the old denominations, I will

repeat here a table for such conversion which appeared in my 18th Lesson on the Chemistry of the Farm, Dairy, and Household:—

Amount of—		Multiplied by	Gives the Corresponding Amount of—	
Ammonia	NH_3	0·824	Nitrogen, N	
Ammonium sulphate ...	$(NH_4)_2SO_4$	0·212	Nitrogen, N	
Sodium nitrate (Chili saltpetre)	$NaNO_3$	0·165	Nitrogen, N	
Potassium nitrate (saltpetre) ...	KNO_3	0·1835	Nitrogen, N	
Nitrogen	N	1·214	Ammonia, NH_3	
Nitrogen	N	4·714	Ammonia sulphate	
Potassium sulphate	K_2SO_4	0·541	Potash, K_2O	
Potassium chloride	KCl	0·631	Potash, K_2O	
Potassium nitrate	KNO_3	0·466	Potash, K_2O	
Potash	K_2O	1·850	Potassium sulphate	
Tricalcic phosphate ...	$Ca_3P_2O_8$	0·458	Citrate insoluble	Phosphoric acid, P_2O_5
Monocalcic phosphate ...	$CaH_4P_2O_8$	0·607	Water soluble	Phosphoric acid, P_2O_5
Tetracalcic phosphate ...	$Ca_4P_2O_9$	0·391	Citrate soluble	Phosphoric acid, P_2O_5
Limestone, marble	$CaCO_3$	0·560	Lime, CaO	
Gypsum	$CaSO_4$	0·411	Lime, CaO	

It will be noticed in this table, and also in the table of analyses, that **phosphoric acid** appears under three different headings—**water soluble, citrate soluble,** and **citrate insoluble phosphoric acid.** A short explanation of these terms will not be out of place.

In bones, and in most of the mineral phosphates, phosphoric acid exists in combination with lime, in the form of a calcium phosphate: **Tricalcic phosphate,** which is insoluble in water and in citric acid solutions, but soluble in mineral acids. On account of this insolubility the action of bone manure and mineral phosphates is exceedingly slow, and may extend over many years. The finer the bones or the phosphates are crushed or powdered the quicker will be the action, and for this reason the fineness of the bone meal is of importance, and should be stated.

When strong sulphuric acid is allowed to act on this insoluble tricalcic phosphate, part of the lime combined with the phosphoric acid is withdrawn, lime sulphate or gypsum being formed and the phosphoric acid is left in the form of **monocalcium phosphate.**

$Ca_3P_2O_8$	+	$2H_2SO_4$	=	$2CaSO_4$	+	$CaH_4P_2O_8$
Bone phosphate or tricalcic phosphate.		Sulphuric acid.		Gypsum		Monocalcium phosphate or superphosphate.

This new compound is soluble in water, and therefore readily available to the plants, but on account of the special process of manufacture it is the most expensive form of phosphoric acid in our fertilisers. The superphosphate is generally manufactured from steamed bones, bone ash, and mineral phosphates. Mineral phosphates containing a high amount of iron or alumina are not suitable for the manufacture of superphosphates, because these bases readily recombine with this acid phosphate, to form again insoluble phosphates, called reduced or reverted phosphates. A similar change would take place if lime were added to superphosphate, and also in soils containing a large amount of lime, a **dicalcium phosphate,** $Ca_2H_2P_2O_8$, may be formed, which is insoluble in water, but soluble in citric acid solutions. Another form of a lime phosphate is found in basic slag or Thomas phosphate—namely, **tetracalcium phosphate,** $Ca_4P_2O_9$, which also is insoluble in water, but soluble in saline solutions, particularly such which contains salts of citric acid. These last two compounds are, therefore, classed as citrate soluble phosphoric acid, which is fairly readily absorbed by the plant roots, and, therefore, comes close in its value to the water soluble phosphoric acid. Basic slag is an artificial product, and should be ground as fine as possible, and a good sample of this fertiliser should

nearly all pass through a sieve having 100 meshes to the linear inch. Thomas phosphate is one of the cheapest and best sources to supply phosphoric acid; it is of particular value to sour lands, deficient in lime but rich in humus.

The amount of citrate soluble phosphoric acid is generally determined in basic slag only; and in many instances the phosphoric acid, given as citrate insoluble in the accompanying table of analyses, may contain small amounts of citrate soluble phosphoric acid.

Nitrogen is the most expensive of all the fertilising ingredients of a manure, and is chiefly supplied in form of **nitrate nitrogen,** as in Chili saltpetre, or in form of **ammonia salts,** as in ammonium sulphate, or in form of organic nitrogen, as in blood, meatworks manure, &c. Nitrate of soda is a very quick-acting manure; nitrogen in the form of nitrate is in the most available form, but nitrates are not readily retained or absorbed by the soil, and therefore liable to be washed away by heavy rains. Nitrogen in ammonium sulphate is not in such an available form, as it has to be changed into nitrates by the process of nitrification. Favourable conditions and lime salts are necessary for this process, and in soils very deficient in lime this manure, therefore, may give poor or no results. Ammonium salts are retained and absorbed by the soil, and losses in the drainage water are not to be feared.

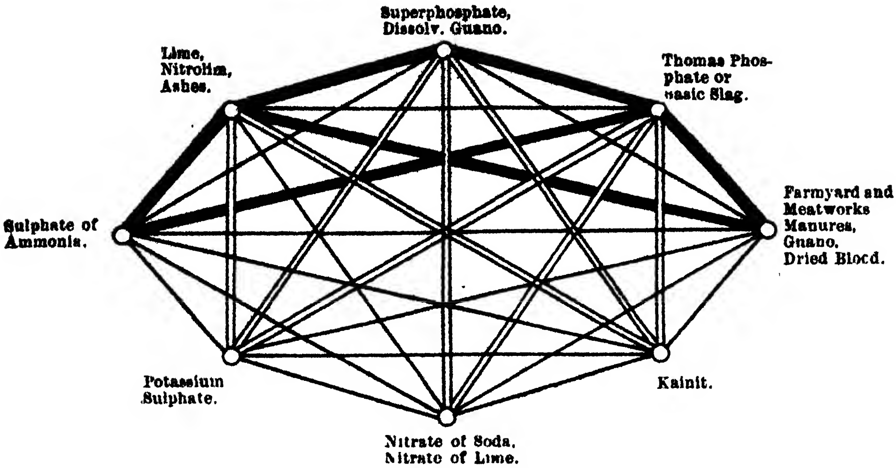
Of particular interest are the samples of **nitrate of lime,** and **nitrolim** or **calcium cyanamide,** of which large quantities are being imported.

These artificial fertilisers, which are really produced from nitrogen in the air, have given excellent results in a very large number of manuring trials, conducted the last three or four years, all over the world. I believe that our soils, of which a great number are rather deficient in lime, will derive particular benefit from these nitrogenous manures. The form of nitrogen in nitrolim is apparently nearly as available as the nitrogen of nitrates, much quicker in action than ammonia nitrogen, and not depending on the presence of lime in the soil. Nitrate of lime has the great advantage over nitrate of soda of not draining so easily through the soil. Nitrate of soda rather tends to exhaust soils, and spoils their physical conditions by depriving them of the lime, which faults are prevented by using nitrate of lime. Nitrolim is a very fine slate black powder, not liable to cake, and may be mixed with almost any artificial manure. As already stated, the action of this manure is only slightly slower than that of nitrates, and the large amount of lime (up to 50 per cent.) which it contains is in itself a great advantage. I believe that this new manure will prove of great value to our pineapple farmers and cane-growers.

Potash is generally used in form of the potassium sulphate. The chloride and kainite are as a rule not so suitable to our soils.

In studying the composition of the mixed fertilisers on the table of analyses, it will be noticed that in most of them the amounts of phosphoric acid are rather high as compared with the amounts of nitrogen and potash. For this reason I generally recommend farmers to make their own mixtures from the pure concentrated manures, according to the requirements of their soil and crops.

When **mixing fertilisers** together, such mixtures must be avoided which would lead to decomposition, which, for instance, would take place if ammonium sulphate was mixed with lime or with Thomas phosphates, superphosphate with lime; or which may cause caking, like mixing kainite with Thomas phosphate. A very simple guide for the mixing of manures is given in the accompanying diagram, devised by Dr. Geekens, which I slightly modified, however, to apply to our local conditions.



Manures joined by a *heavy black line* should *never be mixed* together; those connected by a *double line* must only be *mixed immediately before use*; and those joined by a *thin single line* may be safely *mixed* together *at any time.*

It is a matter of extreme difficulty to fix the monetary value of a manure, as so many factors influence the value. Cost of manufacture and mixing, bagging, rebagging, labelling, loss during storages, deterioration and decomposition on keeping, carriage and freight, &c., have to be taken into consideration. Again, in many cases the value derived from the chemical composition does not represent the actual value of the fertiliser, which again depends upon many causes, local conditions and requirements.

Some method of comparison is absolutely necessary, and for this purpose it is customary to use **unit values,** which are the cost price of 1 per cent. per ton of the various fertilising constituents, or actually the cash value of 22.4 lb. of each ingredient. For instance, in a sulphate of ammonia costing £15 per ton, containing 20.68 per cent. of nitrogen, the unit value of nitrogen would be $\frac{15 \times 20}{20.68} = 14.5s. = 14/6$.

The following **unit values** were approximately fixed for the calculation of **the manurial value per ton in Brisbane**:—

		s.	d.
Nitrogen ..	as nitrate	16	0
	in ammonium salts	14	6
	in blood, fine bone, &c.	14	6
Potash ...	as sulphate	5	6
	as chloride	5	0
Phosphoric acid	water soluble	5	3
	citrate soluble	4	0
	Insoluble as in fine bones	3	0

As an example, we will calculate the value of the mixed fertiliser No. 81, Shirley's Special Cane Manure, which is supposed to contain 7 per cent. water soluble phosphoric acid, 7·7 per cent. nitrogen, and 7·7 per cent. potash. From the analysis we find that it contains 8·50 per cent. water soluble phosphoric acid, ·91 per cent. insoluble phosphoric acid, 6·90 per cent. potash, and 7·70 per cent. nitrogen, and the value ton is, therefore, as follows:—

N	7·7	×	14s. 6d.	=	111·65s.
K_2O	6·90	×	5s. 6d.	=	37·95s.
Water sol. P_2O_5	8·50	×	5s. 3d.	=	44·63s.
Insol. P_2O_5	·91	×	3. 0d.	=	2·73s.
					196·96s = £9 16s. 11½d.

The advertised price of this manure is £9 10s. per ton in Sydney, or £9 2s. 6d. per ton in 10-ton lots.

On the whole, it may be stated that these comparative manurial values fairly well represent the market value, if the manures are purchased on a fairly large scale. It is, of course, quite impossible to get manures in small lots of 1 or 2 cwt. at this price, particularly such manures as superphosphate and nitrate of soda, which require frequent rebagging.

Farmers have the means in their own hands to attain cheap and reliable fertilisers—they simply have to co-operate and order large quantities, a few months ahead, and in this case the fertilisers will be obtained just as cheaply here in Brisbane as in Sydney or Melbourne.

Of course, for our Western and Northern farmers the freight on manure will considerably raise the cost, but even in these cases considerable saving will be effected on ordering large quantities, and all manure vendors will make special quotations for such orders.

In order to encourage the use of fertilisers, and more particularly to induce experimenting on the part of our agriculturists, I give herewith a table of the **approximate manurial requirements** of **various crops** in lb. per acre:—

MANURIAL REQUIREMENTS IN LB. PER ACRE.

——	Nitrogen.	Phosphoric Acid.	Potash.	Lime.
Bananas	30—60	50—80	30—160	56
Barley	20—40	20—53	50—95	30
Barley, Brewers'	15—20	30—65	60—95	30
Beans	0—27	20—56	75—130	70
Cabbages	100—200	50—70	50—150	150
Carrots	50—70	15—25	40—75	56
Cauliflowers	100—150	30—50	30—60	56
Citrus Fruit	40—80	30—40	40—80	40
Corn	20—80	20—53	50—110	30
Cotton	20—30	30—60	15—30	70
Cucumbers	30—56	20—36	50—72	20
Lucerne	0—10	40—70	65—100	140
Mangolds	50—80	30—70	100—160	56
Meadowlands	50—75	20—30	80—110	40
Onions	60—81	20—36	50—80	56
Peas	0—13	20—56	56—100	70
Pineapples	50—75	50—75	100—150	70
Potatoes	20—53	20—50	67—100	30
Rape	50—70	40—70	60—80	80
Sisal Hemp	10—20	20—40	50—70	50
Sorghum	30—100	30—60	70—150	30
Sugar-cane	30—80	20—60	50—100	50
Tobacco	50—140	50—90	80—150	70
Tomatoes	30—50	15—20	50—80	30
Turnips	90—112	20—33	100—150	80
Wheat	10—40	15—56	20—65	30

From this table the necessary amounts of fertilisers to be applied per acre may be easily calculated. We take, for instance, Cabbages, which require a heavy application of manure, and wish to calculate the smallest amounts required per acre on an average class of soil.

The 100 lb. of nitrogen can be supplied by application of—

485 lb. of ammonium sulphate; or
790 lb. of dried blood; or
630 lb. of nitrate of soda.

The 50 lb. of phosphoric acid can be supplied by—

280 lb. of superphosphate; or
200 lb. of bonemeal.

The 50 lb. of potash would be supplied by 100 lb. of sulphate of potash.

As a rule, in land under cultivation for some time, complete fertilisers, containing all the three principal plant foods, will be required; but, in some instances, one or the other may have to be considerably increased in order to get the best results. This can be generally ascertained by experimenting on a small scale, or a soil analysis may also give the required information. An excess of any particular plant food can be very harmful, and for this reason I

follow with a table giving the **amounts of artificial fertilisers** to be applied to the various crops calculated for the small area of a square yard, and in the case of fruit trees for each tree:—

Experimental Manuring in *Garden and Orchard.*

	Use the following artificial fertisers in oz. per square yard—	
Cabbages, cauliflowers, lettuce, celery	Superphosphate	1¼ to 2 oz.
	Sulphate of potash	0½ to 1 oz.
	Nitrolim	1¼ to 2½ oz.
	(or dried blood	1¾ to 3½ oz.)
Strawberries, tomutoes, potatoes, grass	Superphosphate	1 to 1½ oz.
	Sulphate of potash	0½ to 0¾ oz.
	Nitrolim	1 to 2 oz.
	(or dried blood	1½ to 3 oz.)
Carrots, radishes, turnips, onions, shallots	Superphosphate	1 to 2 oz.
	Sulphate of potash	0¾ to 1¼ oz.
	Nitrolim	0¾ to 1¼ oz.
	(or dried blood	1 to 1¾ oz.)
Peas, beans, and other ligumines	Superphosphate	2 to 3 oz.
	Sulphate of potash	1 to 1½ oz.
	Nitrolim	0 to 0⅓ oz.
Pineapples	Superphosphate	1½ to 3 oz.
	Sulphate of potash	2 to 3 oz.
	Dried blood	3 to 4 oz.
	(or nitrolim	2½ to 3 oz.)
	Use per tree (small to large) in lb—	
Oranges and mandarins	Superphosphate	2 to 5 lb.
	Sulphate of potash	1⅓ to 3½ lb.
	Nitrolim	3 to 9 lb.
	(or dried blood	5 to 14 lb.)
Lemons	Superphosphate	1½ to 3 lb.
	Sulphate of potash	1 to 2 lb.
	Nitrolim	3 to 6 lb.
	(or dried blood	5 to 9 lb.)

In some cases the dried blood may replace the nitrolim or cyanamide in the manuring mixtures.

The effect of all artificial fertilisers will be very much increased if small quantities of **stable manure** can be applied at the same time. The presence of organic matter in the form of **humus** is of the greatest importance to keep up the fertility of a soil; and in a loose, well-worked soil the manures are always more effective.

When we consider the **functions** of the various **plant-foods**, it may be stated as a general rule that **potash**, which is found most abundantly in young leaves and twigs of plants, is intimately connected with the production of starch, sugar, and other carbohydrates in the leaves, and subsequent transference of these bodies to the fruits. Part of the potash is generally returned back to the soil after it has done its work in the plant.

Nitrogen promotes the growth of leaves and stems, and rather retards maturity and development of buds and flowers. The leaves show generally a deep green colour, and the whole of the plant becomes more vigorous in its growth by the application of nitrogenous manure. The amount of nitrogen in the plant itself and corresponding amounts of proteins are generally increased.

Phosphoric acid has a rather ripening effect on plants. Phosphates are generally found in the seeds, partly in association with the proteins and partly associated with fats, more particularly in Lecithin, a highly nutritious fatty compound, found in many seeds. No plant would produce seeds unless a sufficient quantity of phosphoric acid in the form of phosphates is present in the soil.

Lime aids in decomposition of organic matters, and also converts many compounds into a more available form. Its chief action, however, is to improve the physical condition of soils, particularly loosening heavy clay soils, and also, again, giving body to light sandy soils. Lime also counteracts any acidity produced by decaying vegetable matters.

ANALYSES OF FERTILISERS.

TAKEN AND ANALYSED UNDER "*THE FERTILISERS ACT OF* 1905."

Number of Analysis.	Fertiliser.	Where Obtained.	Moisture.	Phosphoric Acid P_2O_5. Water Soluble.	Citrate Soluble.	Citrate Insoluble.	Potash, K_2O.	Nitrogen, N.	Comparative Manurial Value per Ton. £ s. d.	Remarks.
	Simple Fertilisers: Potash Manures.									
83	Sulphate of potash	Campbell and Amos, Bundaberg	·21	...	...	...	51·6	...	14 3 10	95·4 per cent. potassium sulphate.
119	Ditto (Shirley's)	Paul and Gray, Brisbane	2·58	...	...	..	50·2	...	13 16 1	92·7 per cent. ditto
299	Ditto	T. S. Beatty, Mackay	1·48	...	...	..	51·08	...	14 0 1	94·5 per cent. ditto
300	Ditto	ditto ditto	1·91	...	...	...	51·68	..	14 4 3	95·5 per cent. ditto
358	Ditto	Webster and Co., Brisbane	4·78	..	...	...	50·48	...	13 17 8	93·2 per cent. ditto
	Simple Fertilisers: Nitrogenous Manures.									
79	Sulphate of ammonia .	Campbell and Amos, Bundaberg	·47	..	...	.	...	20·40	14 15 10	96·1 per cent. ammon. sulphate.
1364	Ditto	Brisbane Gas Company	·02	...	...	..	...	20·39	14 15 7	96·1 per cent. ditto
115	Ditto	Paul and Gray, Brisbane	·19	..	.	..	...	20·15	14 12 3	94·8 per cent. ditto
372	Ditto	South Brisbane Gas Company	2·31	...	...	..	...	20·05	14 10 9	94·4 per cent. ditto
127	Ditto	Petersen, Brisbane	·67	...	...	...	...	19·82	14 7 5	93·3 per cent. ditto
302	Ditto	T. S. Beatty, Mackay	·46	...	...	..	...	21·04	15 5 1	99·1 per cent. ditto
320	Ditto	Colonial Sugar Refining Company, Limited	3·61	...	..	...	...	20·07	14 11 0	94·5 per cent. ditto
80	Nitrate of soda	Campbell and Amos, Bundaberg	1·28	...	..	...	...	15·90	12 14 5	96·4 per cent. sodium nitrate.
104	Ditto	Webster and Co., Brisbane	1·53	...	...	..	..	16·40	13 2 5	99·4 per cent. ditto
116	Ditto	Paul and Gray, Brisbane	·67	..	...	...	...	16·10	12 17 7	97·6 per cent. ditto
121	Ditto	Petersen, Brisbane	1·82	...	..	..	...	15·95	12 15 2	96·7 per cent. ditto
	Bone, Blood, Meatworks Manure, Etc.									
84	Bonedust (Runcorn)	Queensland Fertilising Company, Runcorn...	7·19	...	...	25·24	...	3·65	6 8 8	
98	Ditto	Ditto ditto	6·98	...	.	23·87	...	3·53	6 2 9	
122	Ditto	Summerlin, Brisbane	8·09	...	...	24·56	...	3·21	6 0 3	
123	Ditto	Wood, Brisbane	10·55	...	...	24·00	...	3·24	5 18 11	
125	Ditto	Petersen, Brisbane	8·16	...	...	22·89	...	3·55	6 0 5	
272	Bonedust	Q.M.E. and A., Brisbane	6·04	...	...	25·35	...	3·61	6 8 5	
301	Coarse bone meal	T. S. Beatty, Mackay	8·48	...	...	21·00	...	3·63	6 4 8	
78	Dried blood. (Q.M.E& A.Co.)	Campbell and Amos, Bundaberg	16·71	...	...	...	...	12·09	8 15 4	
208	Ditto	Gladstone Meatworks	8·78	...	...	...	...	12·26	8 17 9	

128	Dried blood (Gladstone M.W.)	Aplin, Brown, and Crawshay ...	11·03	..	...	...	...	12·83	9 6 4	
274	Ditto	Q.M.E. and A., Brisbane ...	16·46	...	...	..	..	11·65	8 8 11	
74	Fertiliser	C.Q.M.E. Company, Lake's Creek ...	8·81	...	...	17·42	...	4·03	5 10 8	
75	Ditto (Meatworks) ...	Campbell and Amos, Bundaberg ..	4·94	..	...	21·82	...	3·40	5 14 9	
77	Ditto (Fitzroy Meatw'ks.)	Wyper Bros., Bundaberg	4·62	..	...	25·12	...	3·16	6 11 2	
124	Ditto (Baynes Bros.) ...	Petersen, Brisbane	8·90	...	...	24·53	...	3·20	5 19 11	
154	Ditto (ditto) ...	Gleeson, Stanthorpe	5·73	...	...	18·10	...	4·50	5 19 7	
198	Ditto (Fitzroy)	C.Q.M.E. Company, Lake's Creek ...	11·16	...	..	21·09	...	4·10	6 2 9	
209	Ditto	Gladstone Meatworks	5·80	...	...	14·24	...	6·53	6 17 5	
32	Ditto (Gladstone M.W.)	Aplin, Brown, and Crawshay	6·06	...	...	13·32	...	6·26	6 10 9	
273	Ditto	Q.M.E. and A. Co., Brisbane ...	8·35	...	...	15·62	...	5·72	6 9 10	
298	Ditto	N.Q.M.E. Co., Limited, Townsville ..	5·96	...	...	19·70	...	5·12	6 13 4	
303	Ditto (C.Q.M.A. & E.Co., Rockhampton)	T. S. Beatty, Mackay	6·17	..	...	23·22	...	4·01	6 7 10	
304	Fertiliser (Ross River Works)	Q.M.E. and A. Co., Brisbane	4·41	...	...	17·06	...	4·63	5 18 4	
1475	Ditto ditto	ditto ditto ...	6·18	...	...	15·50	.	6·12	6 15 3	
230	Ditto (Alligator Creek)	C.S.R. Co.	10·10	..	..	18·97	...	5·26	6 13 2	

Mixed Fertilisers, Superphosphates, &c.

76	Superphosphate	Campbell and Amos, Bundaberg	8·25	16·00	..	1·32	..	...	4 11 11	
101	Ditto (Crown brand)	Webster and Co., Brisbane	17·00	15·50	...	1·70	.	...	4 6 6	
110	Ditto (Shirley's) ...	Paul and Gray, Brisbane	11·97	17·60	...	·46	...	...	4 13 10	
321	Ditto (ditto) ..	Colonial Sugar Refining Company ...	13·39	17·80	...	·15	.	..	4 13 11	
139	Ditto (Shirley's No. 1 36, 38	W. Jones and Sons, Toowoomba	12·07	17·79	.	1·28	...	...	4 18 2	
102	Basic slag	Webster and Co., Brisbane	·43	.	9·09	3·08	..		2 5 7	Fin , 77 per cent.
111	Shirley's No. 0	Paul and Gray, Brisbane .	2·75	3·63	.	7·98	5·70	2·18	5 5 11	
112	Ditto No. 3	ditto ditto	9·20	12·92	.	1·03	2·10	2·95	6 5 3	
152	Ditto No. 3	Lawson and Co., Stanthorpe . ..	9·05	13·17	..	·10	2·12	2·89	6 3 0	
82	Ditto No. 3	Duffy Bros., Bundaberg	8·17	12·75	..	·80	2·40	2·40	5 17 4	
138	Ditto No. 3	W. Jones and Sons, Toowoomba	9·30	12·68	..	1·10	2·28	2·78	6 5 9	
126	Ditto No. 5	—— Petersen, Brisbane	8·60	11·57	...	·41	7·16	3·03	7 6 3	
114	Ditto No. 5	Paul and Gray, Brisbane	6·84	13·22	.	·22	7·35	3·18	7 11 1	
153	Ditto No. 5	Lawson and Co., Stanthorpe	5·92	12·92	...	·43	6·82	3·03	7 9 7	
137	Ditto No. 7 .. .	W. Jones and Sons, Toowoomba	8·59	10·81	..	1·94	4·08	1·40	5 5 2	
113	Ditto No. 9	Paul and Gray, Brisbane	5·52	6·70	...	2·50	4·02	5·91	6 1 6	
317	Ditto No. 9	Lawson and Co., Stanthorpe	1·06	6·24	...	1·63	3·80	3·93	5 15 6	
136	Ditto No. 11	W. Jones and Sons, Toowoomba ...	8·17	11·06	...	1·18	6·40	Nil	4 16 11	
316	Ditto No. 11	Lawson and Co., Stanthorpe	5·66	12·80	...	·22	6·82	Nil	5 0 4	
120	Ditto No. 14	Paul and Gray, Brisbane	4·04	4·83	...	10·81	5·60	1·98	5 15 5	
117	Ditto No. 19	ditto ditto	3·51	5·46	..	6·21	2·42	3·35	5 9 2	
118	Ditto £ s. d. cane fertiliser	ditto ditto	2·79	8·70	..	·31	6·40	7·64	9 12 9	
81	Ditto special ditto	Duffy Bros., Bundaberg	2·09	8·50	..	·91	6·90	7·70	9 16 11	
69	Cereal Guano (Crown brand)	Cribb and Foote, Ipswich	9·20	8·00	...	4·38	2·64	3·47	5 19 11	
107	Ditto	Webster and Co., Brisbane	10·48	7·38	..	4·40	2·32	3·48	5 16 2	

ANALYSES OF FERTILISERS—*continued*.

TAKEN AND ANALYSED UNDER "*THE FERTILISERS ACT OF* 1905."

Number of Analysis.	Fertiliser.	Where Obtained.	Moisture.	Phosphoric Acid P_2O_5. Water Soluble.	Citrate Soluble.	Citrate Insoluble.	Potash, K_2O.	Nitrogen, N.	Comparative Manurial Value per Ton. £ s. d.	Remarks.
	Mixed Fertilisers, Superphosphates, &c.—*continued*.									
103	Crown A Fertiliser	Webster and Co., Brisbane	11·18	13·25	..	2·97	8·30	Nil	6 3 7	
105	Crown B ditto	ditto ditto	10·48	11·08	...	3·09	8·12	3·46	5 17 7	
108	Crown C ditto	ditto ditto	5·77	8·10	...	1·20	12·40	6·18	10 3 11	
216	Crown M ditto	Burns Philp, Normanton	8·16	8·13	...	4·47	2·23	3·60	6 0 9	
323	Mt. Leal'l Root Crop No. 1	Mourilyan Syndicate, Limited	12·98	2·49	...	6·79	6·66	2·59	5 7 8	
322	Ditto ditto No. 2	ditto ditto	10·85	8·52	...	1·93	8·15	1·40	6 4 5	
	Miscellaneous Fertilising Substances.									
	Molasses	..	20·00	..	...	·22	3·85	·73	1 12 5	Containing 9·07 % ash, of which 1·28 % lime and ·45 % magnesia.
	Sea Weed (organic) .. .	.	6·15	...	...	·18	·40	·32	1 7 2	Containing 73·25 % ash, of which 2·76 % lime.
	Ash of Lantana	...	..	...	...	4·81	18·81	..	5 17 11	Lime 22·83 %, magnesia 5·91 %.
	,, Belar (*Casuarina lepidophloi*)	...	...	...	...	·04	8·40	...	2 6 4	,, 83·38 %, ,, 1·42 %.
	,, Gidyea (*Acacia homolophylla*)	...	...	...	...	·02	1·16	...	0 6 5	,, 91·44 %, ,, 2·70 %.
	,, Apple Tree (*Angophora subrelutina*)	..	..	.	...	·34	4·45	...	1 5 6	,, 29·65 %, ,, 8·05 %.
	,, Tobacco (Queensland)	..	.	..	...	5·36	27·05	..	8 4 10	,, 40·70 %, ,, 14·32 %.
	,, Pineapple Plants ..	...	...	...	..	5·88	15·02	..	5 0 3	,, 7·20 %, ,, 4·60 %.
	,, Grape Marc	...	...	...	..	10·45	23·62	...	8 1 4	,, 6·62 %, ,, 2·12 %.
	,, Bottle Tree (*Sterculia rupertis*)	..	..	...	...	·24	29·02	...	8 0 4	,, 23·48 %, ,, 13·35 %.
	,, Banana Plants ...	...	..	...	...	1·46	36·61	...	10 5 11	,, 21·33 %, ,, 7·02 %.
	,, Coffee Berry Pulp ...	...	..	...	..	7·84	54·64	...	16 4 0	,, 6·94 %, ,, 14·75 %.
	,, Sisal Hemp	...	...	...	...	4·60	8·00	...	2 17 10	,, 31·86 %, ,, 21·31 %.
	,, Cane Tops	...	...	...	...	4·90	6·49	...	2 10 5	,, 4·78 %, ,, 4·96 %.
	,, ,, Trash	...	...	...	...	3·20	4·90	..	1 16 7	,, 4·00 %, ,, 2·60 %.

Entomology.

PROTECTION OF NATIVE BIRDS IN QUEENSLAND.
THE NATIVE BIRDS PROTECTION ACTS.

By HENRY TRYON, Entomologist.

The obligation on the part of the State of Queensland to recognise the important part played by its Insectivorous Birds, and to obviate in like manner the extermination of its native kinds generally, is evinced by the existence of no less than three separate legislative enactments in our statutes and by the issue of twenty-five (or more) Proclamations—under the authority of their provisions—by the Governor in Council. Moreover, the Proclamations already made and brought into force at particular dates have been from time to time summarised in the *Government Gazette.*

Notwithstanding, however, the existence of this provision for securing the important purposes alluded to, there is a very considerable lack of knowledge regarding its nature and scope, even amongst those who are not entirely ignorant that the enforced protection and preservation of Native Birds is a matter that has been placed within their own hands to give practical effect to, as well as to provide.

The three Acts of Parliament alluded to are—(1) "*The Native Bird Protection Act of* 1877"; (2) "*The Native Birds Protection Act Amendment Act of* 1877"; and (3) "*The Native Birds Protection Act Amendment Act of* 1884."

PARTS OF QUEENSLAND WHEREIN BIRDS PROTECTED.

The Acts are not immediately operative throughout the whole of Queensland, but their provisions apply to certain areas that are referred to as (A) Districts and (B) Reserves, that have been declared areas for the preservation of Native Birds or may be constituted as such.

A. *Districts.*—The districts for the protection and preservation of Native Birds are—(1) those specified in "*The Native Bird Protection Act of* 1877," section 10, these being the Burnett, Darling Downs, East Moreton, Port Curtis, West Moreton, and Wide Bay Districts; and (2) Petty Sessions Districts proclaimed as such for the purposes of the Act since—*i.e.*, Townsville, Charters Towers, Ingham, Cardwell, Mackay, Burke, Cook, Norman, Palmer, Somerset, Cairns, Cape River, Croydon, Ayr, Mourilyan, and Bowen.

Under section 10 of the principal Act additional Districts may be brought by Proclamation within the scope of its provisions or of those of the enactments by which it is amended. Hitherto—as we have just seen—the Districts (*vid.* p. 185) proclaimed have been conterminous with Petty Sessions Districts, and have received the names that these bear.

B. *Reserves.*—The Reserves that are referred to are of two kinds—(1) Crown lands, and (2) other lands subject to the consent of their occupiers or owners. These reserves are created by Proclamation in accordance with the provisions of section 1 and section 5 of the Amendment Act of 1884; and may embrace, so far as they are concerned, not only land as ordinarily understood, but also any land covered by water, and

indeed even any waters, provided that they be within the territorial jurisdiction of the State. They include the following areas:—

1. *Areas occupied by water, or swamps*—

Enoggera Reservoir (and Catchment Area).
Pumice Stone Channel and the Shores thereof.
Gold Creek Reservoir (and Catchment Area).
Chelmer Water Reserve.
Emu Park Water Reserve.
Lake Clarendon.
The Duck Pond, Gracemere.
Horseshoe Lagoon, Selkirk.
Church Lagoon, Jarvisfield.
Red-lily Lagoon, Jarvisfield.
Murray's Lagoon, Rockhampton.
Jardine's Lagoon, Rockhampton.
Burdekin Weir (Charters Towers).
Russell Wilkins' Water Reserve (Yeerongpilly).
Lake Murphy, Broadmere.
Pentland Dam and Swamp.

2. *Islands*—

Dunk Island.
Kumboola Island.
Mound Islet.
Family Islands (Thorpe, Richards, Wheeler, Coombe, Bowden, Smith, Hodson).
Brooke Islands.
Mud Island (M. Bay).

3. *Privately-owned lands and lands held in trust, &c.*—

Enoggera Catchment Area.
Gold Creek and Moggill Creek Drainage Areas.
Boonara Run (county of MacKenzie).
Mount Coot-tha Reserve.
Chelmer Recreation Reserve.
Toowong Creek (Enoggera)—privately-owned land.
P. F. MacDonald's (Yaamba).
Eumara Holding (Eumara).
Stud Farm for breeding police horses (Wyseby and Aubrey).
A. J. McConnell's (Dugandan).
Abattoir Reserve (Townsville).

4. *Parishes, Shires, &c.*—

Gracemere (P.).
Crow's Nest (P.).
Douglas (P.).
Emu Creek (P.) (Cavendish).
Southport.
Moggill Creek (Drainage Area).
Seaforth.
Cressbrook (P.).
Bowman (P.).
Neara (P.)

England and Clarendon.
Fitzroy.
Nicholson.
Faraday.
Calioran.
Cloyna.
Anthill (P.).
Jarvisfield (P.).
Redcliffe (Shire).

Conditions with respect to Reserves.—(1.) Every Reserve for the protection of Native Birds under the Acts shall have been duly proclaimed a Reserve by the Governor in Council, evidence of such proclamation being the publication of the same in the *Government Gazette.* [*Note.*—The *Government Gazette* of 23rd July, 1910, Vol. XCV., pp. 204-5, cites the references to the publication in it of the Proclamations constituting the Reserves created to date of this writing.]

(2.) With respect to every Reserve again, there must be set up at a convenient and conspicuous place in the boundary of such Reserve, and, when such boundary is of sufficient length, at intervals not exceeding one-half mile between each, a Notice or Notices legibly written or printed stating that the Reserve in question has been duly proclaimed, and in a concise manner its extent.

(3.) An officer—named a Ranger—may be appointed by the Governor in Council to carry out proceedings under the Acts; publication of such appointment in the *Government Gazette* being authority for him so to do.

To this list of Reserves others may be added by Special Proclamation on the part of the Governor in Council—in fact, any party's farm may be created a Reserve for the purpose of the Native Birds Preservation Acts. Moreover, a Proclamation, declaring any area a Reserve, may be subsequently amended, varied, and annulled by the authority creating it.

Birds Protected.

The Birds generally subject to the operation of the Native Birds Preservation Acts within any *District* are limited to—(1) those specified in the Schedule of the principal Act of 1877; together with (2) those that since 1877 have been added to this Schedule by Proclamation. To this list thus constituted the names of further birds or classes of birds may be added from time to time, similarly by Proclamation.

In the case of Reserves the birds subject to legal protection are those that have been specified in the Proclamations by which the particular Reserves have been respectively constituted. In accordance with past procedure the list of such birds has corresponded with that of the Native Birds to which the Acts apply in the Districts in which they are in operation and that contain the Reserves; but with regard to the Parishes of Crow's Nest, Douglas (Aubigny), and Emu Creek (Cavendish), the protected birds include only Taliegallas or Scrub Turkeys, Bronze Wing and all Wild Pigeons, Emus, Regent Birds, and Quails.

The authority that can amend, vary, and annul Proclamations proclaiming a Reserve can also similarly deal with the List of Birds for whose preservation such Reserve has been constituted.

Permanent and Seasonal Protection.

The measures legally prescribed for the preservation and protection of Native Birds apply in two ways, as follows:—(1) Continuously; (2)

Seasonally. When Native Birds are only protected for a certain season or period of the year, this period is spoken of as a "Close Season" with respect to those affected. In the Districts proclaimed, some of the Native Birds, within the operation of the Acts, are continuously or permanently protected (Schedule A); some are only protected during a definite period (Schedule B).

Birds Continuously or Permanently Protected.

Schedule A.

The Native Birds that—in the proclaimed Districts—are protected throughout the year and whose destruction with respect to them is accordingly illegal are as under:—Black Swan, Cassowary, Dollar Bird, Land Curlew, Kestrel (or Nankeen Kestrel), Magpie-lark, Spoonbill, Lyre Bird, Black Cockatoos, Cranes, Egrets, Cuckoos, Doves, Dragoon Birds or Pittas, Finches, Grass Parrots, Laughing Jackasses, Herons, Honey Eaters, Ibis, Kingfishers, Kites, Larks, Magpies, Martens, Minah Birds, Morepork Owls, Owls, Nightjars, Pheasants or Coucals, Robins, Wagtails, Woodpeckers, and Wrens.

With respect to the Districts of Cairns, Croydon, Townsville, Ingham, Cardwell, Ayr, Bowen, and Mackay, protection throughout the year is accorded to all Waders, all Insectivorous Birds, Brown Hawks, and Native Companions.

These Birds include those originally specified in the Schedule to the Act of 1877 and others declared by proclamation since to be subject to its operation. The list so constituted is entitled Schedule A.

Birds Seasonally—i.e., not Permanently—Protected (Subject to the Operation of a "Close Season").

Schedule B.

The list of Native Birds, including Classes of Birds protected during certain months of the year only, is as follows:—Bittern, Black Swans, Bower Birds, Brown Hawks, Bustards or Plain Turkeys, Curlews (other than land), Dottrells, Ducks, Emus, Finches, Geese, all Insectivorous Birds (except those specified in Schedule A), Land Rails, Native Companions, Pigeons (Wild), Plovers, Quails, Regent Birds, Rifle Birds, Satin and all Bower Birds, Scrub Turkey or Tallegalla, Scrub Turkey or Megapode, Waders, Water Rails.

This Seasonal or Partial Protection—the institution of a "Close Season"—concerns principally—as will appear from the foregoing list—Native Birds commonly used for food purposes and Game Birds; and the portions in the Acts and in the Proclamations thereunder that deal with it accordingly represent in this State the Game Laws of other countries.

The Specific Season during which a close period may prevail commonly covers or is co-extensive with the Breeding Season for the Native Birds to which it applies, and accordingly it may occupy with respect to these Native Birds in one District a different portion of the year from what it does in another. Again, and for the same reason, in a single District different "Close Seasons" may be proclaimed for different Native Birds.

The complicated arrangement of Close Seasons in the State as a whole, thus brought about, has been reduced to an admirable Conspectus by the Department of Agriculture and Stock. This may be here cited. [*Vid. Government Gazette,* 23rd July, 1910, pp. 204-5.] It is as follows:—

BIRDS: THE PROTECTION OF, IN RESERVES.

Periods of the Year during which the Acts are in Operation (Close Seasons).

Birds specified in—	District.	Close Season.
Schedule B	Ayr and Charters Towers	From the 1st December in each year to the 31st May in the following year, inclusive.
Schedule B	Bowen and Port Curtis .	From the 1st November in each year to the 30th April in the following year, inclusive.
Schedule B (with the exception of Emus in Darling Downs and Quails)	Burnett, Darling Downs, East Moreton, West Moreton, and Wide Bay	From the 1st September in each year to the 31st March in the following year, inclusive.
(Emus)	Darling Downs	From the 1st to 7th July in each year, inclusive.
(Quails)	Burnett and Wide Bay	From the 1st November in each year to the 31st May in the following year, inclusive.
(Quails)	Darling Downs and West Moreton	From the 1st October in each year to the 30th April in the following year, inclusive.
(Quails)	East Moreton	From the 1st November in each year to the 12th May in the following year, inclusive.
Schedule B (with the exception of Wild Ducks, Geese, Turkeys, and Pigeons)	Burke, Croydon, and Norman	From the 1st October in each year to the 30th April in the following year, inclusive.
(Wild Ducks and Geese) ...	Burke, Croydon, and Norman	From the 1st January to 31st March in each year, inclusive.
(Bustards or Plain Turkeys and Pigeon)	ditto	From the 1st May to 31st July in each year, inclusive.
Schedule B	Cairns, Cardwell, Cook, Mackay, Mourilyan, and Palmer	From the 1st October in each year to the 30th April in the following year, inclusive.
Schedule B (with the exception of Finches)	Cape River	From the 1st November in each year to the 28th April in the following year, inclusive.
(Finches)	Cape River ..	From the 1st September to the 31st December in each year, inclusive.
Schedule B (with the exception of Wild Ducks)	Ingham .. .	From the 1st November in each year to the 31st May in the following year, inclusive.
(Ducks, Wild, of any species) ...	Ingham . .	From the 1st January to the 30th June in each year, inclusive.
Schedule B (with the exception of Wild Ducks, Geese, Turkeys and Pigeons)	Somerset .	From the 1st October in each year to the 30th April in the following year, inclusive.
(Wild Ducks and Geese)	ditto . .	From the 1st December in each year to the 28th February in the following year, inclusive.
Bustards or Plain Turkeys) ...	ditto	From the 1st February to 31st May in each year, inclusive.
(Pigeons)	ditto .. .	From the 1st May to 31st August in each year, inclusive.
Schedule B	Townsville ..	From the 1st December in each year to the 30th June in the following year, inclusive.

Except in the case of the three Reserves in the Toowoomba District (Parishes of Crow's Nest, Douglas, and Emu Creek), and that are Reserves for the continuous protection of Scrub Turkeys (Tallegalla), Pigeons, Emus, Regent Birds, and Quails, all Native Birds that are protected in the Districts already named for portion of the year only or for the whole of the year, are protected so far as they are concerned throughout the entire twelve months, and they are accordingly characterised as being "Reserves within which the destruction of Native Birds is prohibited during the whole year"—in fact, they are "Bird Sanctuaries."

Birds: No Protection in Certain Cases.

Native Birds, notwithstanding the Acts and Proclamations thereunder, in certain circumstances set forth in the following provision, may not enjoy any protection:—"Nothing in the said Act ('*The Native Bird Protection Act of* 1877') shall apply to any person killing Native Birds upon his own land for the *bonâ fide* protection of his own crops or to any servant killing Native Birds upon the land of his master by direction of his master for the *bonâ fide* protection of such master's crops, or to any aboriginal killing Native Birds for his own food."

Offences.

The Protection and Preservation of Native Birds provided for by law consists in laying down that the following acts are to be regarded as offences, and that a penalty either of the nature of a fine or of imprisonment must necessarily attach to the commission thereof, that is to say—

(1.) The wilful killing or destruction by any means whatsoever (including firearms, poisons, &c.) within the scope of the Acts within the Districts in which they apply either during the "Close Season" so far as it concerns the native birds that are not continuously protected throughout the year (Schedule B), or at any time whatever so far as concerns the native birds that are.

(2.) The wilful killing or destruction by any means and also the capture by any means of the birds referred to as Native Birds in the respective Proclamations separately constituting Reserves within the meaning of the Act of 1884, at any time of the year, and both when the offending party is within the Reserve itself and when he wilfully kills or captures any Native Bird passing in flight over it but is not within it.

(3.) The buying, selling, or knowing possession of any Native Bird within the scope of the Acts or of any Proclamation thereunder, and within the period during which protection for such bird obtains. [*Note.*—Anyone being the owner of any Native Bird in confinement or in a domesticated state, &c., and notwithstanding detention of it on his part, is excepted from this provision.]

(4.) The use of any instrument whatever, net, or other means (including poison) within the period to which the Acts apply (*i.e.*, during the close season) in any District and with respect to any Native Bird to which protection there applies.

(5.) The use of a swivel gun or of a gun used otherwise than from the shoulder for the purpose of wounding or killing a Native Bird within the scope of the Acts in any District to which they apply, and in which such wounding or killing is permissible, and during the period of the year also when it may be effected.

(6.) The following offences apply to any person found upon a Reserve offending as described under No. 2:—

(*a*) When found committing any of the offences laid down not giving his name and address to any person who may demand the same.

(*b*) Not delivering up to any person demanding the same any Native Bird or any instrument, net, or means used to kill or destroy such bird.

(*c*) Assaulting the person demanding possession of bird, instrument, net, or other means of destruction as aforesaid.

Penalties Attaching to Offences.

[*Note.*—The infliction of a prescribed fine is imperative under the *Native Bird Protection Act of* 1877 (41 Vict. No. 7, Queensland).]

A.—A fine of no less than £1 or more than £5, and in default of payment imprisonment for any term not exceeding three months—

(1.) For wilfully killing or destroying any Native Bird to which the Act of 1877 or its Amending Act of 1884 applies within the Districts to which these Acts apply, and during the period of the year in which with respect to these Districts they are in operation. [*Vid.* "Offences," 1.]

(2.) For using any instrument whatsoever or any net or other means (*e.g.*, poison), under the same circumstances and within the same period, for the purpose of killing and destroying any Native Bird or Birds coming under these Acts. [*Vid.* "Offences," 5.]

(3.) Killing, destroying, or capturing Native Birds in Reserves [*Vid.* "Offences," 2.]

B.—A fine of not less than £1 or more than £5 for every Native Bird detained. [*Vid.* "Offences," 3.]

C.—A fine of any sum under £10 for the first offence, and more than £10 but less than £20 for each subsequent offence as a penalty for the use of a Swivel Gun, &c. [*Vid.* "Offences," 5.]

D.—A fine not exceeding £5, besides any other penalty that may have been incurred under the Act or Acts (*Vid. Supra*) for assault. [*Vid.* "Offences," 6 (*c*).]

E.—Fine not prescribed in the case of other Offences proved to have been committed. [*Vid.* "Offences."]

Instituting Proceedings.

A constable, or any other person qualified to lay an ordinary information, may institute proceedings.

In the case of a Reserve provision is made for such action being taken also by a special officer—a Ranger of such Reserve—duly appointed by the Governor in Council.

Reward for Conviction of Commitment of Offence.

A moiety of every penalty recovered under the Act of 1877 (and Acts amending the same) shall be paid to the person or persons laying the information from which such penalty has issued.

Exemption from Proceedings—Court for Instituting Proceedings.

[*Vid.* Birds: No Protection in Certain Cases.]

The Court for instituting proceedings under the Act is the nearest Court of Petty Sessions to where the offence is committed.

Appeal from any judgment entered thereat as the outcome of such proceedings may be made to the next District Court held nearest to the Petty Sessions Court.

The "WILD COCHINEAL INSECT," WITH REFERENCE TO ITS INJURIOUS ACTION ON PRICKLY PEAR (*OPUNTIA SPP.*) IN INDIA, Etc., AND TO ITS AVAILABILITY FOR THE SUBJUGATION OF THIS PLANT IN QUEENSLAND AND ELSEWHERE.*

By HENRY TRYON.

(Entomologist and Vegetable Pathologist.)

Prickly-pear (Opuntia spp.) prevalent in India.

Prickly-pear (*Opuntia spp.*) is very common almost throughout every district of India—*e.g.*, in the Punjab, the Bombay Presidency (at Candeish, Poonah, and Belgaum especially), the Deccan, the Madras Presidency, Ceylon, &c.

This is no recent occurrence. Thus, with regard to its prevalence in the Bombay Presidency early last century, it has been stated that prickly-pear grew rapidly and universally through the Deccan and Candeish, overrunning almost every uncultivated and barren spot of ground about Poonah amongst other places. [Giberne (G.), Trans. Agr. and Hort. Soc. of India, VI., App., p. 11, 1839.]

Species of Prickly-pear Plants Naturalised in India.

With regard to the kinds of prickly-pear found naturalised there, the Officiating Reporter on Economic Products to the Government of India, who had made the subject one of special inquiry, informed the writer in September, 1903, as follows:—

"We have in India to my knowledge the following cacti:—(1.) *Opuntia dillenii*, which is common now almost throughout every district of India except the central parts of the Punjab and the Madras Presidency and very common at Belgaum (Bombay Presidency); (2.) *Opuntia cochinellifera*, in the Punjab and Belgaum—not common; (3.) *Opuntia monacantha*, Southern Punjab and Assam; and (4.) *Opuntia sp.*, not determined, very common in the Madras Presidency."**—Burkill, I. H., *in litt.*

Prevalence of Prickly-pear in India Early Occasioned Public Procedure for its Suppression.

It has been stated with regard to Poonah (Bombay Presidency) that, upwards of a century since, "some money and much trouble were expended in vainly endeavouring to eradicate it." [Giberne (G.), Trans. Agr. and Hort. Soc. India, VI., 1839, p. 11.]

The same remark, it is understood, applies to other parts of India. Thus regarding its occurrence in the Punjab—and especially in that part known as the Jallandhar doab, as I. H. Burkill has informed the writer—the Indian Government "offered a reward for the destruction of the obnoxious pest."

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* This is a fuller consideration of a subject previously dwelt upon by the writer (*vid.* Annual Report of the Entomologist and Vegetable Pathologist, 1903-4, and *Op. Cit.*, 1909-10).

** Queensland and New South Wales Naturalised Species.

The Colonial Botanist—F. M. Bailey—identifies the common prickly-pear of Queensland with *Opuntia vulgaris*, Miller. (*The Queensland Flora*, II., p. 704.) The Government Botanist of New South Wales—J. H. Maiden—states that *Opuntia monacantha*, Haw., is probably the most widely diffused prickly-pear in Australia, and that it is common about Sydney and the Hunter River district, and near Melbourne. He also records as other naturalised species of New South Wales, *Opuntia vulgaris*, Haw.; *O. tuna*, Mill.; *O. stricta*, Haw. (syn. *O. inermis*, De C.); and *O. braziliensis*, Haw. ("A Preliminary Study of Prickly Pears naturalised in New South Wales"—*Agr. Gaz.*, N.S.W., IX., No. 9, Sep., 1898.)

Prickly-pears (Opuntia spp.) and the Cochineal Insects.

There is a small group of insects, comprising—as far as has been hitherto ascertained—some six different kinds, that subsists exclusively upon *Opuntia.*

These insects—yielding the well-known dye named Cochineal, or carminic acid, the essential principle in the aluminium compound carmine —are named the cochineal insects.

Of these cochineal insects one furnishes carmine in much greater amount than any other, and is the famous *Grana fina* of commerce (also known as *Mesteque*), originating in the Oaxaca district of Mexico, and that is peculiar in only thriving upon a particular species of prickly-pear, the Nopal (*Opuntia tuna,* Linn.—syn. *O. cochinelifer,* De Cand., not of Linné.), and in requiring special attention to secure its perpetuity. In fact, "it becomes extinct everywhere, when deprived of the care of the cultivator, unless favoured by particular advantages of situation" (G. A. Prinsep).

This insect, known as *Dactylopius* or *Coccus cacti,* is generally accompanied in Mexico by one of the inferior cochineal insects, spoken of as the Wild Cochineal, that yields the *Grana sylvestre* of commerce. The latter is much more vigorous than the *Coccus cacti.* Its body is clothed with a white cottony covering that enables it to withstand the inclemencies of the weather, so that it requires no particular care or cultivation that its persistence and multiplication may result. Hence, when the *Grana fina* and the *Grana sylvestre* have been simultaneously conveyed from Mexico for establishing the cochineal industry in other countries, this wild insect has survived when the former has succumbed. [*Note.*—It appears not improbable that the term "*sylvestre*" or "Wild" has been applied to more than one kind of cochineal insect differing from *cacti.*]

One of These is Harmful to the Plant on which it Subsists.

Regarding this more vigorous cochineal insect, Thiery de Menonville states: "They multiply themselves so rapidly as to exhaust and destroy the plants, on which account in Mexico they are almost all collected at the end of every two months and the plants perfectly cleansed by wiping them with wetted cloths." [Giberne, (G.).]

Again, in a report published by the Royal Cadiz Economic Society, it is remarked: "The cultivators of Oaxaca sedulously destroy the *sylvestre,* saying that it weakens and destroys the Nopals."

Thiery de Menonville's observations were made in Mexico in 1777, but the destructiveness towards prickly-pear plants exhibited is still exercised by them there now. Thus in a work, "Las Plagas de la Agricultura," published in Mexico in 1902, the following statement occurs:—"La grana silvestre es et temible enemigo del nopal, por loque es menster perseguirla de muerte, no obstante que tambien da buen tinte." *Cit.* p. 202. [*Trans.:* The wild cochineal is a terrible enemy of the Nopal, and can accomplish its destruction, unless steps be taken to prevent its doing so.]

The Wild Cochineal Insect that may prove Harmful to the Prickly-pear Introduced to India.

(1.) In 1795 a Captain R. Neilson brought* to India from Brazil "some cochineal insects of the kind called by the Americans *Sylvestre,*

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* This fact is mentioned also by Dr. Whitelaw Ainslie in his "Materia Medica of Hindostan," Madras, 1813. It is evidently also the introduction of the cochineal insect referred to by Dr. Roxburgh himself in his *Flora Indica,* Vol. II., p. 475-6, Serampore (Madras), 1832.

and delivered them to Dr. Roxburgh, the Superintendent of the East India Company's Botanical Gardens at Calcutta." [G. A. Prinsep.] *

A portion of the cochineal insects imported by Captain Neilson was "forwarded to Madras, addressed to Dr. J. Anderson, the Company's Physician-General there" (*ib., Op. cit.*).

The cultivation of this cochineal insect was freely encouraged by the Madras Government, 1796-1809; the East India Company buying the cochineal that was raised, and extensively exporting it to England, where it was known in the trade as "Madras Cochineal" (*ib., Op. cit.*)

(2.) A second introduction of the Wild Cochineal or *Sylvestre* was made, also—in 1821-2—by G. A. Prinsep. When formerly resident at Vera Cruz he had found the Wild Cochineal (that he mistook for the *Grana fina*) growing in an experimental plantation of some extent at Campeachy. Some of this he took with him to England, establishing the insect on *Opuntia* at the Botanical Gardens at Chelsea. From the latter place, in 1821 and again in 1822, he transferred it to Bombay. On his arrival there he found that it was identical with the Wild Cochineal or *Sylvestre* that was already common in India—evidently the result of Captain Neilson's 1795 importation (*cf.* Prinsep, G. A., Trans. Agr. and Hort. Soc. India, I., App., pp. 29, 30, Calcutta, 1839).

The fact of these introductions of the *Sylvestre* Cochineal seems, however, to have been soon forgotten. Thus in January, 1836, F. P. Strong sent to the Agricultural and Horticultural Society of India "some native cochineal made from the insect I [he] sent to the society on the prickly cactus plant," procured from the uncultivated lands at Russa-puglah; and G. Evans, reporting on it in March of the same year, stated that he was "of opinion that it is [was] the wild indigenous *Coccus cacti* of the country, from the circumstance of its being so generally diffused over all parts of India and being known to most of the natives as the 'Kemes dan' from feeding on the 'Phoonimoonsha' or common Prickly-pear (*Cactus Ficus-Indica*)."

A third introduction of the Wild or *Sylvestre* Cochineal insect to India took place in 1836. This was effected by Captain Charlton from the Cape of Good Hope; Baron Ludowigne having previously received it in about 1832 at the latter place from Hamburgh, and established it there. Captain Charlton's consignment was placed in the East India Company's Garden at Calcutta (*vid.* Trans. Agr. and Hort. Soc. India, VI., App. 1839). The source beyond Hamburgh from which the Cape of Good Hope Wild Cochineal—received there about the year 1832—emanated, is not now ascertainable. Moreover, there are some grounds for concluding that it was a distinct kind from that that has been naturaised so long in India and Ceylon.**

* "Measures which have been pursued by the Court of Directory of the Government of India, with a view to the introduction of the True Cochineal Insect into the British Territories in India."—G. A. Prinsep, 1838. [Indian House Records.]

** This matter has been somewhat fully gone into since the Government Entomologist of Ceylon, E. E. Green, in addressing the writer in May, 1903, wrote: "Your letter of 5th instant has interested me considerably, as I have for some time been endeavouring to ascertain the origin of our local cochineal insect. Our Government appears to have lost all record of its introduction."

Since its Introduction to India in 1795 the Wild Cochineal Insect has from time to time Proved Highly Destructive to Prickly-pear.

(1.) The first recorded extensive destruction of *Opuntia* in India is that mentioned by Sir Whitelaw Ainslie,* who says that such great quantities of the cochineal insect appeared on the Coromandel coast that they almost rendered extinct one of the four kinds of *Opuntia* growing there. [Burkill, I. H., M.A., Officiating Reporter on Economic Products to the Government of India, 25, IX., 1903, *in litt.*]

(2.) The second recorded occurrence of a wholesale destruction of cactus in India is that which occurred in the Punjab in 1849-50. There spread through the country-side there, then, an epidemic of a cochineal insect which killed the cactus outright. The insects disappeared with the disappearance of the cactus. [Burkill, *ib.*]

(3.) A similar occurrence occurred about the years 1859-1863, in the southern part of the Bombay Presidency about Belgaum. [Burkill, *ib.*]

(4.) These insects must have occurred very numerously also in the extreme north and north-east of Ceylon in 1865 and earlier; since they were procured there—by Dyke—for utilisation elsewhere. [Lewis, J. P., Manual of the Vanni Districts, Government of Ceylon, 1895.]

And in this connection E. E. Green has also stated to the writer: "I have been informed, by an old resident, that many years ago the cochineal insect was very abundant on the *Opuntia* plants in the dry northern provinces, and that the plants were actually killed down by the insects" [*in litt.*, 3-5-1903].

The Wild Cochineal Insect on being found to Multiply Spontaneously Utilised in India for Prickly-pear Subjugation.

(1.) The Madras Government required its officers to help in the distribution of the insect in consequence of the great nuisance caused by spread of this plant—the Opuntia. [Diary of — Dyke, 1865-68, quoted by Lewis (J. P.)].

(2.) A. W. Seys—in a letter dated 10th April, 1902—stated that about thirty-nine years previously [1863] the Government of India utilised an insect for the destruction of prickly-pear, employing men in disseminating it. It was introduced to each clump of "pear" to be operated upon on a leaf or two. In the course of propagation the insect became disseminated through the entire patch. After about a year had elapsed, the "pear," after having turned yellow, dried up and died. Mr. Seys states, regarding this serviceable agent, that it "was an insect or grub."

(3.) Colonel A. F. Laughton, C.B., Retired List—in a letter dated 21st March, 1902—stated that in 1863-65, in the part of India in which he was residing, living cochineal insects were procured and thrown on the prickly-pear bushes. In a short time this weed throughout large tracts withered away as though it had been burnt by fire, leaving the land bare. The insects—he also remarked—propagate with great rapidity, and so it is only necessary to procure a few living examples. Moreover, he submits the following personal experience:—"I can testify that I have on several occasions taken on the end of my walking stick portions of the

plant covered with the insect and thrown them on patches of flourishing pear, which after a few weeks entirely withered away."

(4.) Dyke, previous to 1865, and also again in this year, introduced insects destructive to prickly-pear from Jaffna at the extreme north of Ceylon, and from Trincomalie on its eastern coast to Mullaition; and "so great was the destruction they caused that three years afterwards the Assistant Agent could not find a plant [of prickly-pear] near Mullaition to destroy." [Lewis (J. P.), Manual of the Vanni Districts, Government of Ceylon, 1895.]

Sir William Twynam, K.C.M.G., formerly Assistant Agent at Mannah under Dyke, and Government Agent of the Jaffna province, has stated that he both recollected the insect and the occurrence mentioned by Lewis; the "larva" fed on the young leaves of the Opuntia; weaving a kind of web over them to protect itself; and, with regard to its action, that it "reduced whole masses of the Opuntia to a condition of pulp, and rapidly killed it out at the roots." [Twynam (Sir W.) to J. Rudd, Jaffna, Ceylon.]

THE IMPORTED AND PRICKLY-PEAR DESTROYING COCHINEAL INSECTS IDENTICAL.

The identity of the insects figuring in these occurrences with the Wild Cochineal (*Grana sylvestre*) is suggested by the fact—(1) That the introduction of the latter from Brazil and the destruction of its host-plant are both dealt with by Dr. Whitelaw Ainslie; (2) that this destructiveness was evinced where the introduced insect was conveyed; (3) and since, not only did the purposely introduced insect yield cochineal dye ("Madras Cochineal")—although to a much less extent than did the true Cochineal Insect (*Grana fina*)—but so did the one that through excessive developments in its numbers proved such a cacticide also.

Thus in the instance of the wholesale destruction of cactus in India, that occurred in the Punjab in 1849-50, the native dyers made extensive use of the windfall while it lasted [Burkill (I. H.), *in litt.*]; and when the insect was used for prickly-pear destruction in the Jaffna province of Ceylon by Dyke, "Cochineal of a kind was manufactured from it." [Sir. W. Twynam.]

THE SPECIES OF PRICKLY-PEAR AFFECTED BY THE WILD COCHINEAL IN INDIA.

I. H. Burkill, in treating of the subject in 1903, stated that he could not definitely tell which of them [the species of naturalised cacti] the cochineal insects killed in the respective places because the record is in considerable confusion (*in litt.*)

There are, however, grounds for concluding that the species to which it was especially partial was *Opuntia dillenii*, Haworth (syn. *Opuntia indicus*). Dr. Roxburgh, in dealig with this plant in his "Flora Indica" (Vol. II., p. 475-6, Scrampore, 1832), states that "the cochineal insects lately brought from America [by Captain Neilson] thrive and multiply abundantly" on it.

Again, J. Bell, Secretary to the Agricultural and Horticultural Society of India, reporting the results of experiments that he carried out

*Ainslie [Whitelaw, M.D., M.R.A.S.], a surgeon in the service of the East India Company, 1788-1815. It has not been practicable to verify this reference. This probably relates to the "Materia Medica of Hindostan," Madras, 1813, where also Captain Neilson's importation in 1795 of the Wild Cochineal form America [Brazil] is mentioned.

in 1837-8, not only stated that he "procured a plant of the *Cactus indicus* growing on the roadside between Cossipore and Dum Dum (Bombay) covered with the wild insect"; but that when *Cactus tuna, C. indicus,* and *C. cochinillifer* were grown side by side, "on each of the intervening *indicus* plants, the insects blanched them like driven snow, and have continued to multiply beyond the strength of the leaves ever since"—*e.g.,* "Reports" upon the cochineal insects committed to his care by the Agri. Society of India, 1 (March) and 2 (Aug.), 1838. Again (still referring to *Opuntia indicus* and the "wild insect"), "the *indicus* plant became perfectly white with the cottony covering of the devouring insect."—(Report 2.)

Now, since, as Burkill informs the writer, "*Opuntia dillenii* is common now almost throughout every district of India, except the central parts of the Punjab and the Madras Presidency—very common at Belgaum," there are grounds for concluding that it was this species also that it decimated when it multiplied to such formidable numbers in the instances already mentioned.

The Species of Prickly-pear Affected by the Wild Cochineal in other Countries.

In Mexico and the West Indies, &c., the insect regarded as the *Sylvestre* or Wild Cochineal is reared on the *Cactus cochinellifer*, Mill. dict. (*Cactus cochinellifer*, Lin.); and on its being introduced to the Cape of Good Hope in association with the plant named, it was found that it preferred the cactus growing wild there—*Opuntia vulgaris,* Miller (syn. *Cactus opuntia*, Linn.)—to *cochinellifer*, Lin. (*Fide* Vaupell and G. A. Prinsep). In his Indian experiments J. Bell found that, although the "*wild* insect" would feed on this species, it preferred *indicus* (*O. dillenii*). The Wild Cochineal Insect of the Argentine States of South America—*Dactylopius argentinus*, Dominiquez—is said to feed there on *O. ficus indica* and *O. aurantiaca* (*cf.* Autran (E.)—"Las Cochenillas argentinas"). *Note.*—In this connection it may be remarked that the Cochineal Insect (*Dactylopius cacti*) of Mexico, that yields the *Grana fine* of commerce, displays a special *penchant* for a single species of Opuntia (*Opuntia tuna*, Linn.; *cochinellifer*, De Candolle), and will not thrive on any other.

The Prevalent Species of Prickly-pear in Australia.

The species of some of the sections of the genus *Opuntia* are greatly confused by the descriptive writers of plant life. The commoner Queensland prickly-pear, according to the Colonial Botanist, is *Opuntia vulgaris*, Miller—a species that, as has been stated, the wild cochineal formerly fed upon at the Cape of Good Hope. In Victoria and New South Wales, on the other hand, the most prevalent prickly-pear is *Opuntia monacantha* —"probably the most widely diffused prickly-pear in Australia" (Maiden). [This species, as I. H. Burkill has informed the writer, occurs in the Southern Punjab and Assam districts of India.]

The Identity of the Wild Cochineal Insect of India.

The cochineal insects associated with the Prickly-pear Plants (*Opuntia spp.*) belong to a special group of Coccidæ not know to occur on any other kinds of vegetation. These have been referred to the genera

Coccus, *Dactylopius*, and *Pseudo-coccus*, but, according to Mrs. M. E. Fernald, a writer who has bestowed great attention on the subject, should correctly be included under the second of these designations. The kinds until recently described are as follows:—(1) *Dactylopius coccus*, Costa, yielding the most esteemed cochineal, or *Grana fina*; (2) *Dactylopius confusus* (*Ckll.*), a species occurring in Arizona, New Mexico, and Mexico, &c.; (3) *Dactylopius confusus newsteadi* (*Ckll.*), occurring in Arizona, Colorado, Texas, Jamaica, and Antigua; (4) *Dactylopius tomentosus*, occurring in New Mexico, Arizona, and Mexico, &c.; and (5) *Dactytopius argentinus*, Dom., Argentine Republic The Wild Cochineal Insect, occurring in Ceylon (and India), E. E. Green referred to in 1896 as a new variety of *Dactylopius cacti* that he named *Ceylonicus* (*cf.* "Catalogue of Coccidæ collected in Ceylon," No. 43. *Ind. Mus. Notes IV.*, 1, p. 7, 1896). And addressing the present writer in 1903, he stated:—"I have made a careful study of these [Ceylon] insects. They appear to be specifically distinct both from typical *Coccus* (*Pseudo-coccus*) *cacti* and from the American species *confusus*, *tomentosus*, *tomentosus var. newsteadi*. I base these distinctions on the dermal characters (*e.g.*, the number and form of the spines). The same form occurs on Opuntia in India. In my Monograph of the 'Coccidæ of Ceylon,' I am describing the local cochineal under the name *Coccus indicus*." [Green, E. E., *in litt.*] Subsequently, in 1908, having meanwhile received specimens from India (Kangra) forwarded by Burkill on *Opuntia dillenii* (*O. indicus*), he gave to it the specific rank alluded to under this title *D. indicus*. At the same time he indicated the character that distinguished it from other members of the genus that embraced it, *i.e.*, the presence of crowded cylindrical spines, both very short and stout. [*cf.* "On Indian Scale Insects (Coccidæ)." Part III., *Mem. Dep. Agr. Ind. Ent.*, Ser. II., 2, p. 28, 1908.] Thus he does not appear to have been struck by the anomaly of an insect invariably associated with a particular group of plants (*Cactaceæ*) originating in India, where that plant group was not represented prior to its introduction by human agency.

Doubt may be entertained as to its being identical with the Wild Cochineal or *Sylvestre*, early naturalised at the Cape of Good Hope. Although this was introduced already in 1836 by Captain Charlton, as has been already stated (pg. 190), there is no evidence of its having become accidentally disseminated or purposely distributed. Again, E. E. Green stated to the writer in May, 1903, that he had "established a thriving colony of the Cape insect on an Opuntia here" (Peradeniya, Ceylon), and having at the same time the Indian Wild Cochineal before him, with which he must have compared it, does not suggest their identity. The same remark applies to John Bell's experiments with the cochineal insect of the Cape of Good Hope also at Calcutta in 1838. [*Vid.* Reports 1 and 2, Trans. Hort. and Agr. Soc. India, VI., App. pp. 34-37 and 52-57. Calcutta, 1839.] From a consideration of the facts set forth in this report it will be inferred that the wild cochineal destructive to prickly-pear in India emanated from Brazil, whence it was imported by Captain Neilson in 1795. Adolph Hempel, in writing on the Coccidæ of Brazil in 1900, only mentions the occurrence there alone of the *Grana fina* (*D. cacti*, Lin.), citing as his authority Dr. H. V. Ihering. However, a writer, quoted in the Transactions of the Agr. and Hort. Socty. of India for 1838, states: "I made trial, about the year 1787, of some [the *sylvestra*] that had been sent from thence [Brazil] about the year 1787." —*Op. cit.*, Appendix, p. 26—which indicates that Neilson actually derived his consignment therefrom.

The Wild Cochineal Insect is no longer Destructive to Prickly-pear either in India or Ceylon, or even Prevalent There.

The writer has not met with reference to any large increase in numbers amongst the wild cochineal insects of India having taken place since 1865.

E. E. Green, one of our most profound students of the Coccidæ, and the author of the superb "Coccidæ of Ceylon," in response to inquiries made in 1903, after stating that he had received examples of a cochineal insect attacking Prickly-pear (*Opuntia sp.*) from several parts of the island [Ceylon], added: "It is certain that, at the present time, this insect has no practical effect in keeping down the Opuntia. It is a comparatively scarce coccid in Ceylon, although I have seen individual plants badly infested, and such plants have an unhealthy yellowish appearance. I have been informed, by an old resident, that many years ago the cochineal insect was very abundant on the Opuntia plants in the dry northern provinces, and that the plants were actually killed down by the insects. But, on visiting that country two years ago, I found the plant rampant, and not a trace of the insect." [Green E. E., *in. litt.*, 30th May, 1903.]

I. H. Burkill writes also: "I have travelled through the greater part of India, and have everywhere been much interested in the prickly-pear, because I have been endeavouring to ascertain how many of them India has. I have, therefore, made a point of examining these plants wherever I went, but in one place only—namely, Kangra—have I found the cochineal insect. . . . It will thus be obvious to you that the insect is very rare in India, although so many essays at cultivating it in both North and South India have been made. The insect has, therefore, not found a congenial home." [Burkill, I. H., *in litt.*, 25th September, 1903.

Discussing this decadence, E. E. Green states: "It seems very possible, therefore, natural enemies arose that now keep the insect in check. I have not, however, been able to determine any such enemies." On the same subject I. H. Burkill writes: "Two alternative explanations may be put forward—(1) That it dies out after killing its food; (2) that certain seasons kill it. I cannot attempt to give an authoritive opinion on these, but, knowing the care exercised in the Canaries (with regard to rearing cochineal—H. T.) in both directions, both may be right."—*In litt.*

Introduction of the Wild Cochineal Insect Destructive to Pricky-pear to Queensland.

As the outcome of negotiations, entered upon by the writer in May-July, 1903, with certain officials in India and Ceylon, examples of the wild cochineal insect of these regions were received here in September of that year. Unfortunately, however, this importation did not lead to its successful establishment here. The fact is thus alluded to in the Annual Report of the Entomologist and Vegetable Pathologist for 1903-4 (Report Department of Agriculture, Queensland, 1903-4, p. 68, Brisbane, 1904):—

"*Prickly-pear Destruction.*—Interest in the pressing question regarding the means to be adopted in dealing with the prickly-pear weed has continued, as in previous years, to be shown by the office, and in this connection it may be remarked that, in pursuance of a project suggested by it in 1900, embracing the utilisation of the insect fauna of the plant itself for its destruction, there was imported from Ceylon a special species

of *Pseudo-coccus,* with the enlightened assistance of the Government Entomologist (Mr. E. E. Green) of that dependency. Unfortunately, however, only four or five larval examples of the insect named arrived—out of a considerable consignment—in a living condition, and the efforts taken to secure their continued existence proved futile. The repetition of this action, with a more favourable outcome thereof, is one that it is hoped will soon be chronicled, since assurance has been given by Mr. Green of his readiness to co-operate in the undertaking."

From circumstances, that need not be recited here, further action in the direction indicated has not since 1903 been pursued.

QUESTION AS TO HARMFULNESS TO VEGETATION OTHER THAN PRICKLY-PEAR FOLLOWING THE INTRODUCTION OF THE WILD COCHINEAL.

Regarding the possible injury to other plants arising from the introduction of the wild cochineal insect, this need not—it may be remarked—be entertained—*i.e.*, if insects belonging exclusively to the genus *Pseudococcus* (and now ascribed in a strict sense to *Dactylopius*) be brought here, and not ones that might be mistaken for these, and that are very pernicious to vegetation. It is due, however, to the writer to cite an opinion to the contrary and its refutation. Thus G. A. Prinsep writes: "I have heard it asserted by Dr. Fleming that the wild cochineal introduced into India attacked not only the native *Cactus*, but even hedges of *Euphorbia* and other plants, doing great damage in the gardens of the Europeans. This must be erroneous, of course, since it will not even feed upon all kinds of cactus. Experiments made in Mexico have determined that nothing but the cactus will do for it, and that it will not fix upon the analogous plants known there under the names of *Pitahaya* or *Cirius, Nzaga* or *Tecocomtl,*" &c.

CONDITIONS TO GOVERN ITS INTRODUCTION TO QUEENSLAND AND ITS PROPAGATION THERE WHEN THIS IS ACCOMPLISHED.

(1.) The Government to be prepared to prosecute inquiries in countries wherein the wild cochineal insect or insects are indigenous, or have become naturalised on being introduced—*e.g.*, Mexico, West Indies, Brazil, Argentina, Senegal, Cape of Good Hope, and especially in India and Ceylon.

(2.) To employ in those inquiries one whose scientific attainments and official status will command the ready co-operation of those specially qualified by knowledge and position to promote them.

(3.) The work to be deputed to a special staff.

(4.) In the case of India and Ceylon to secure, if practicable, the assistance of the Government Entomologists, Messrs. E. E. Green and H. Maxwell Lefroy, as well as that of the Reporter on Economic Products.

(5.) Assuming that the wild cochineal, that formerly destroyed the prickly-pear in India and Ceylon, be the one now occurring in these territories, special investigation be conducted to ascertain—(1) the causes now operating to restrain its natural productiveness; and (2) the environment conducive to its free development.

(6.) Should these be found to consist in the operation of parasites, predatory insects, or disease, to ascertain and give effect to measures for avoiding the introduction of these with the wild cochineal insect they prey upon.

(7.) Should, on the other hand, it be discovered that the checks on increase have been brought about by conditions of growth affecting the prickly-pear or ones of environment acting directly on the insect, to advise accordingly; that the wild cochineal on its introduction be not placed under circumstances under which these would operate.

(8.) The project of introducing the insect having been decided upon, a depôt or depôts to be established in Queensland in charge of a specially expert staff, where living examples might be received; parasites and diseases affecting them, if accidentally introduced, eliminated; and whence healthy and vigorous broods might be distributed; such action to be subject in every case to the direction of the officer charged with business of prosecuting the necessary inquiries and deciding the course of procedure.

(9.) At the outset—subsequent to introduction—special care be taken to secure the cochineal insects intended for use in Western districts from becoming artificially associated with predatory insects, parasites, and diseases of local origin.

(10.) Special authority to be exercised under the Commonwealth Quarantine Act or other measure to restrain anyone, other than the officer charged with this special duty, from introducing into Australia prickly-pear plants (Cactaceæ) harbouring cochineal or any other insects, or the insects themselves still alive apart from their host plants, to the end that the grave risk of importing simultaneously other insects that prey upon them, their own parasites, or their diseases, or, indeed, generally unhealthy examples, be prevented. [*Note.*—Should such checks on the increase of wild cochineal insects be introduced, the establishment of the latter here, much less any benefit resulting from the facts, would stand very little chance of being realised.]

Local Conditions Influencing the Establishment and Development of the Wild Cochineal Insect in Queensland.

It is highly probable that if liberated in our coastal districts the insect would perish during wet seasons; also, that it would be extensively preyed upon by special lady-bird beetles—*e.g.*, (1) *Cryptolæmus montrouzieri*, whose marked partiality for coccid insects the writer, on introducing it to the notice of the Australian entomologists, drew attention to in 1889, and which has since been utilised in the many other countries to which it has been transported; and (2) a species of *Chilocorus*, especially common in more Northern coastal areas.

Formerly—as is understood—a cochineal insect of the prickly-pear was introduced to this State which with very little likelihood was the esteemed *Grana fina* or Mesteque (*Coccus cacti*) of Mexico, and which could not withstand the uncongenial conditions which Brisbane and possibly the *Opuntias* selected for its subsistence yielded. This incident refers to the establishment in the Botanical Gardens, Brisbane (in 1871), of a cochineal insect on *O. cochinellifera*.

Again, there is doubt as to any one of the wild cochineal insects (*sylvestra*) being found, when brought here, to thrive on (and so destroy) our locally prevalent prickly-pear, and which the Colonial Botanist states is *Opuntia vulgaris*. However, formerly the wild cochineal insect introduced to the Cape of Good Hope—and which, as already stated, may be really different from the one naturalised in India—is said to have fed there on this species of prickly-pear.

Animal Pathology.

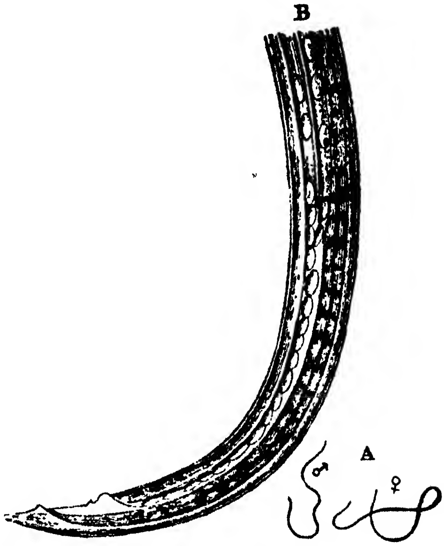
LUNG WORMS IN CALVES.

By A. H. CORY, M.R.C.V.S., Government Veterinary Surgeon.

This affection is known as verminous bronchitis, hoose, or husk. The worms found in the lungs are the *Strongylus micruris* and *Strongylus*

Strongylus Rufescens.

Caudal extremity of the male; magnified 100 diameters.—*Railliet.*

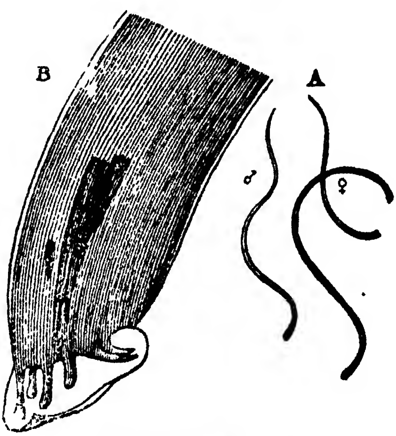


Strongylus Rufescens.

Found in air passages of sheep and goats.

a—Male and female; natural size.

b—Caudal extremity of the female; magnified 50 diameters.—*Railliet.*



Strongylus Micruris.

Found in air passages of calves and older cattle.

a—Male and female; natural size.

b—Caudal extremity of the male; magnified 100 diameters.—*Railliet.*

pulmonaris. The former are the larger, being about 1 to 3 in. long; whilst the latter in only ⅜ to 1¼in. in length. This disease has been known

since the year 1744, when Ruysch discovered worms living in the air passages of calves. Nicholls also refers to the same disease in 1756, when it assumed an epizootic form in England.

Symptoms.—If the worms are not very numerous, one notices an occasional husky cough; and, if the animals are driven or excited, the breathing may appear short and hurried. The disease gradually spreads from animal to animal until the majority exhibit this peculiar cough or hoose. After a few weeks, the cough becomes more frequent, and appears to be suffocating the animals—in some cases suffocation actually takes place. A frothy liquid sometimes streaked with blood is discharged from the nostrils. This discharge contains eggs, also embryo and mature worms. The movements of the worms are easily recognised, particularly when placed in a little warm water. The calf loses condition and strength; the mucous membranes of the eyes and mouth become very pale in colour; eyes sunken; skin hidebound, dry, and scurfy; the hair staring; and occasional diarrhœa. The animal wanders away from the others, and is found lying down apparently listless and poverty-stricken. The duration of the disease varies according to the number of worms present and the general condition and constitution of the animal. Some cases only last two or thee weeks, whilst others survive for several months.

Upon *post-mortem* examination the worms can be found in the air tubes, the lining of which is inflamed; and the lungs frequently have a somewhat mottled or patchy appearance.

Prevention.—Healthy calves should be kept from paddocks where infested animals have been, but horses and sheep can be turned into them with safety. The land, if damp or boggy, should be drained; waterholes are a great source of infection, and should be avoided, if possible; buckets or troughs are better, as these can be frequently cleansed and disinfected. Keep up the strength of the animal by giving good nutritious food, and allow constant access to salt, because salt destroys the young worms as they are taken into the animal's body. Animals dying from this affection should be thoroughly burned or buried deeply.

Treatment.—The quickest and most reliable treatment is to inject a solution directly into the trachea (windpipe). Various solutions have been used; but the following is recommended, and is the dose for a calf:—

Oil of turpentine	1 drachm.
Carbolic acid	½ drachm.
Chloroform	½ drachm.
Glycerine	1 drachm.

To be thoroughly mixed together before using each dose; then slowly injected by means of a syringe into the windpipe.

The needle of the syringe is inserted between the rings of the trachea (windpipe) about half-way down the neck. Some people advocate making a small incision in the skin with a clean knife before inserting the needle; but, if the needle is fairly thick and carefully handled when being pushed through the skin, it will be found unnecessary to incise the skin. This injection causes considerable distress to the animal by setting up paroxysms of coughing; but it passes off without setting up serious irritation, and is effective in destroying the worms.

In bad cases it is advisable to repeat the injection on two or three occasions, allowing some three days' interval between the injections, but in many cases one injection will be found sufficient.

If it is impossible to procure a syringe, a drench composed as follows can be given, but its action is not so certain:—

Oil of turpentine	½ oz.
Creosote	½ drachm.
Tincture of camphor	½ oz.
Milk or linseed oil	4 to 6 oz.

This drench should be given once or twice weekly for some 3 or 4 weeks.

Sheep, and particularly lambs up to 12 months of age, are similarly affected with worms in the lungs, although not the same worms as found in calves. The treatment described in these notes will be found just as effective, except that the dose of medicine given is considerably smaller—viz., about ¼ to ½ of the above doses.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS	1909.					1910							
	Aug.	Sept	Oct.	Nov	Dec.	Jan	Feb.	Mar.	April	May.	June.	July.	Aug.
North.													
Bowen	0·13	0·21	0·36	3·15	19·98	15·15	7·10	21·45	5·26	0·18	2·23	0·58	0·18
Cairns	2·48	0·7	3·19	7·31	15·24	21·80	17·12	24·16	16·13	3·51	6·59	Nil	3·59
Geraldton	5·32	0·36	6·71	11·57	19·98	20·35	24·57	33·74	21·57	11·90	19·35	1·34	7·42
Gindie State Farm											2·65	1·45	Nil
Herberton	0·75	0·50	2·31	4·50	5·11	16·64	12·21	12·40	3·50	1·85	1·70	Nil	0·88
Hughenden	0·33	0·8	1·9	0·51	8·01	4·52	3·59	2·95	0·30	0·41	0·85	0·18	Nil
Kamerunga State Nurs											Nil		3·39
Mackay	0·75	0·73	2·88	3·18	25·56	35·28	9·73	24·31	6·18	3·73	5·70	1·1	0·48
Mossman													1·91
Rockhampton	1·37	1·20	2·16	4·55	2·74	11·93	1·28	19·84	0·01	0·59	5·98	1·67	0·23
Townsville	0·57	0·12	2·07	1·31	11·51	23·07	10·85	17·21	2·29	0·26	1·05	0·33	0·3
South.													
Biggenden State Farm	1·78	0·29		2·83	6·96	7·22	3·09	3·82	0·73	1·06	5·25	0·92	0·28
Brisbane	2·44	2·74	1·56	4·14	6·45	7·24	4·19	6·42	1·22	0·43	6·74	0·39	...
Bundaberg	1·66	0·68	0·42	3·55	2·09	11·81	2·43	8·92	0·31	0·19	6·17	2·10	0·16
Dalby	3·13	0·47	1·92	2·13	2·45	10·88	1·33	3·87	Nil	Nil	6·06	1·42	0·64
Esk	3·81	2·60	2·61	2·69	9·20	8·60	1·94	6·09	1·19	0·27	4·74	0·58	0·23
Gatton Agric. College	2·09	2·29	1·87		3·92	11·73		3·66	0·69	0·61	5·05	1·99	0·60
Gympie	2·80	1·70	2·30	3·82	16·54	5·92	3·48	7·74	1·13	0·22	5·57	0·83	0·32
Ipswich	1·34	3·55	1·63	1·56	4·72	6·91	2·78	3·56	1·65	0·20	3·74	1·67	0·58
Maryborough	2·51	1·56	0·51	3.94	6·83	5·65	2·90	3·92	1·72	0·64	4·80	1·09	0·35
Roma	4·83	0·12	0·90	2·12	1·05	4·74	1·47	8·33	0·15	0·4	5·71	1·24	Nil
Roma State Farm													
Tewantin	4·24	1·38	3·82	1·90	8·85	5·98	3·42	15·18	6·30	1·31	15·08	0·76	1·34
Warren State Farm	...										1·88	...	...
Warwick	2·28	1·77	2·85	2·77	4·25	3·93	3·14	2·57	0·68	0·55	3·16	1·82	0·54
„ Hermitage State Farm	...	...	...	...	...	...	...	...	...	.	...	1·73	0·39
Westbrook State Farm			...	...	...	...	...	...	...	...	2·77	...	...
Yandina	5·81	3·84	2·30	0·76	20·18	6·71	2·07	11·81	3·26	0·40	13·18	0·70	0·15

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND,
Divisional Officer.

General Notes.

THE COLLECTION AND EXPORT OF AIGRETTES AND BIRDSKINS.

We have received from the author, Mr. Harold Hamel Smith, the editor of "Tropical Life," London, a book on the above subject, which treats exhaustively of the destruction of birds for the sake of their feathers and skins. Mr. Smith has had 25 years' experience in tropical commercial and agricultural enterprises, and is, therefore, in a position to discuss the matter of the trade in birdskins in its relation to collectors and hunters for trade purposes. He shows that the charge of cruelty in bird collection can no more be called cruel than shooting game for sport, and especially the frequent maiming of pigeons in pigeon matches. Taking the world as a whole, he comes to the conclusion that no tropical birds are in danger of extermination, or even of becoming rare. If, he says, the killing of game birds, in England especially, is not a wanton and deliberate destruction of birds, no one can pretend that the killing of wild birds in the tropics is. In the matter of extermination of certain birds, Mr. Smith instances the larger and lesser white heron of the high Orinoco and Venezuela. These birds establish themselves in numerous flocks on estates on which the owners absolutely prohibit the shooting of any kind of bird, having a sort of armed police, composed of natives, at their service, in order to protect the breeding of the white herons, which is a source of wealth to them. These colonies of birds, called "garcero," well repay them for the care and trouble, whether they rent the right of picking up the feathers that fall from the birds, or whether they have it done by their own men after the breeding season. In some parts of Brazil, and in the Argentine, the same method is adopted, and no shooting is allowed on the estates.

We have not space to consider the entire contents of the book of 138 pages, but would advise those interested to obtain a copy from the publishing office of "Tropical Life." Mr. Smith suggests the formation of a permanent international committee, to consist of four members of all the countries from whose colonies birdskins or feathers are collected—one member to be a Government official, one to be nominated by the bird-protecting societies, and one each by the importers and the bird-millinery trade.

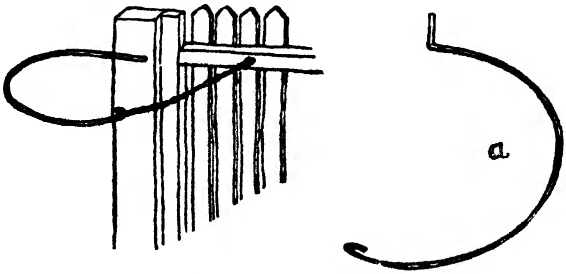
As we understand that a strong movement is now being made in Queensland to discuss the whole question of protection of native birds, we defer any further remarks on the subject until the results of the meetings to be shortly held are known.

We will merely add that the preservation of certain native birds in British New Guinea has been the subject of legislation, and not a day too soon. Such numbers of the various species of the Bird of Paradise, the Rifle Bird, the Crowned Goura Pigeon have been ruthlessly shot for the sake of their plumage, that to our own knowledge some of the former were in danger of practical extermination. We lately travelled through the scrubs of one district in Papua where Birds of Paradise were formerly very numerous, and saw in a fortnight's travel only two. The Goura Pigeons, however, were very numerous. There is, however, no close season for game, but the penalty for shooting protected birds is sufficiently drastic to ensure them immunity from destruction.

SELF-CLOSING GATES.

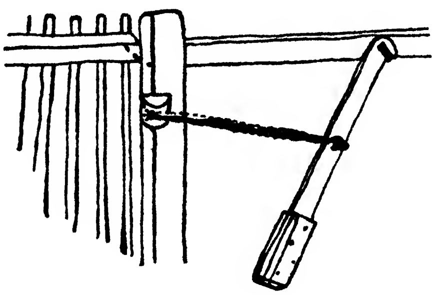
Persons living in the suburbs of a city are continually annoyed by the incursions of goats, horses, and cattle into their gardens. The latter are more especially troublesome, as many of them are adepts at opening gates even when closed by a latch. There are several ways of preventing the entrance of these animals, which are both simple and effective.

These two illustrations (which lately appeared in the "Farmer and Grazier," Sydney) are the inventions of Mr. Geo. H. Shull, who has succeeded in contriving a gate which will be found convenient and cheap. It has been adopted by not a few who have already seen it. The first is made from an old spring raketooth, bent as shown at *a*. This is readily accomplished, without destroying the elasticity of the spring, by heating it to a red



heat just at the places to be bent. The end of the raketooth, after being bent, is put into a hole in the gatepost, and a strong staple driven over it to keep it in a horizontal position. A rope or chain is fastened into a screw ring in the gate and hooked to the spring. This rope or chain should be just long enough so that there will be no strain on it when the gate is shut. The action may be made more or less decided by placing the screw ring nearer to or farther from the hinge side of the gate. This is a very neat fixture, and has the advantage that the rope may be instantly unhooked from the spring when it is desired to have the gate remain open.

The second illustration is of special use in places where it is not desirable to have anything projecting far from the fence, as would be the case at the entrance to a garden having a walk along the side, and where the



spring device would be in the way. A semi-cylindrical piece of wood is nailed to the upright of the gate bearing the hinges, and so placed that the centre of the cylinder would about coincide with the hinges. A chain rope is made fast to this block, and then, by means of a hook, is fastened to a bar which swings from a spike in the upper railing of the fence and bears a weight at the lower end. While this is not so quick acting as the other, if nicely made, it is very neat and quite out of the way. The quickness of action may be regulated by an increase or decrease in the weight, or by fastening the rope to the bar farther from, or nearer to, the weighted end.

TESTING THE SOIL FOR LIME.

Here is a very simple and very cheap test to determine whether lime is present in any soil:—

"Take a few shovelfuls of soil from different parts of the field or orchard, and dry, pulverise, and mix them thoroughly together. Take a few ounces of this powder and reduce to ashes on an iron shovel over a fire. Put these ashes when cool into a glass tumbler, and mix them with as much water as it will take to cover them. Stir this with a glass rod or wooden stick, but not with anything metallic. To this paste add 1 oz. of hydrochloric acid, which is commonly sold as muriatic acid or spirits of salts, the mixture being stirred all the time. If a fairly brisk effervescence takes place, it may be taken for granted that the soil contains a fair percentage of lime, but if little or no effervescence takes place the soil contains little or no lime."

If there is not lime enough in the soil, it must be acid; therefore needs liming. This is far better, and probably more positive than the litmus test, which amounts to little enough sometimes in the laboratory when conditions are far more positive than they are when samples of field soil are involved. —"Farmer."

DESTRUCTION OF TREES BY POISON.

During a visit to the Taroom district, the Hon. the Minister for Agriculture noted that many acres of standing trees appeared to be killed, and on examination and inquiry he found that the trees, instead of being ringbarked straight round, as is the usual method of ring-barking, were rung in an oval fashion, or rather towards a point much in the manner adopted in our fashion of tapping rubber trees. At the top of the rung part, the following solution was poured on:—

White arsenic, 1 lb.; soda crystals, 1¼ lb.; saltpetre, ¼ lb.; water, 1 gallon, diluted to double the quantity if necessary. By this simple means hundreds of trees in the district have been killed, and doubtless, not only the trees, but also their roots, may subsequently be destroyed by fire.

PECAN NUTS.

Referring to our article on the Pecan Nut in the September issue of the *Journal*, Mr. W. Soutter, Curator of the Acclimatisation Society's Gardens, writes:—"With reference to this desirable nut: In 1891 I saw the Pecan-tree in fruit at Maryborough, and upwards of fifty plants were raised from the seed gathered from them. Those plants were distributed by the Acclimatisation Society. There is now a Pecan-tree growing at Bowen Park which carries fruit."

Answers to Correspondents.

ONION FLY.

J. M., Blythedale—

The trouble is possibly due to Thrips or the Onion Fly, the maggots of which feed on them, after which the bulbs rot. *Remedy*:—Spray with 3 pints of kerosene to ½ lb. soft soap, with 1 gallon boiling water. Then dilute with water to make up to 6 or 8 gallons. Kainit broadcasted will keep them off. 1½ to 2 cwt. nitrate of soda per acre may force the growth ahead of the enemy.

In such cases as this it is always advisable to send specimens to the Government Entomologist, Mr. H. Tryon, as it is difficult to determine the nature of the pest from the vague statement that a slug is doing damage.

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	SEPTEMBER. Prices.
Apples (Tasmanian), Eating, per case	10s. to 11s.
Apples (Cooking), per case	6s. to 7s.
Bananas (Cavendish), per dozen	4d. to 6d.
Bananas (Sugar), per dozen	2d. to 3½d.
Cape Gooseberries, per case	4s. 6d. to 5s.
Citrons, per cwt.	11s. 6d.
Cumquats, per quarter-case	1s. to 1s. 6d.
Custard Apples, per quarter-case	...
Lemons (Lisbon), per case	3s. 6d. to 4s. 6d.
Mandarins, per half-case	4s. to 8s.
Mangoes, per case	...
Nectarines, per half-case	..
Oranges (Local), per case	3s. 6d. to 5s.
Papaw Apples, per quarter-case	1s. to 1s. 6d.
Passion Fruit, per quarter-case	3s. to 3s. 6d.
Peanuts, per pound	3d.
Peaches, per quarter-case	..
Pears (choice), per quarter-case	...
Persimmons, per gin case	.
Pineapples (Ripley), per dozen	1s. to 2s. 3d.
Pineapples (Smooth), per dozen	1s. to 3s.
Pineapples (Rough), per dozen	9d. to 2s. 3d.
Quinces, per case	.
Rosellas, per sugar-bag	.
Strawberries, per tray	1s. 3d. to 2s.
Tomatoes, per quarter-case	3s. 6d. to 4s. 6d.

SOUTHERN FRUIT MARKET.

Article.	Prices.
Apples (Local), choice, per case	6s. to 7s.
Apples (Jonathan), per case	8s. to 9s.
Apples (Cooking), per case	3s. to 5s.
Bananas (Queensland), per bunch	3s. to 4s. 6d.
Bananas (Queensland), per case	14s. to 16s.
Bananas, G.M. (Fiji), per bunch	4s. to 5s.
Bananas, G.M. (Fiji), per case	10s. to 17s.
Cocoanuts, per dozen	2s. to 2s. 6d.
Grapes, per box	...
Lemons (Italian), per half-case	...
Lemons (Local), per gin case	3s. to 4s.
Mandarins (Thorneys), choice, per half-case	3s. to 4s.
Mandarins (Queensland), Emperors, per bushel case	7s. to 8s.
Oranges (Local), choice, Navels, per bushel case	8s.
Oranges (S. Australian), per bushel case	10s. to 14s.
Passion Fruit (choice), per half-case	3s. to 4s.
Peanuts, per lb.	5½d.
Pears (Victorian), choice, per bushel case	15s.
Pears (Tasmanian), per quarter-case	4s.
Persimmons (choice), per half-case	...
Pineapples (Queensland), Ripley, per case	6s. 6d. to 7s.
Pineapples (Queensland), common, per case	6s. 6d. to 7s.
Pineapples (Queensland), Queen's, per case	6s. 6d. to 7s.
Tomatoes (Queensland), per half-case	5s. 6d. to 6s. 6d.
Water melons (Local), large, per dozen	...
Water melons, medium and small, per dozen	...
Strawberries (Queensland), per 3-quart tray	2s. 6d. to 5s.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR SEPTEMBER.

Article.		SEPTEMBER. Prices.
Bacon, Pineapple	lb.	7d. to 8d.
Barley, Malting	bush.	3s. 6d.
Bran	ton	£4 5s.
Butter, Factory	lb.	9d.
Chaff, Mixed	cwt.	2s 8d. to 3s. 11d.
Chaff, Oaten	„	3s. to 4s. 2d.
Chaff, Lucerne	„	2s. 6d. to 3s. 6d.
Chaff, Wheaten	„	1s. 9d. to 2s.
Cheese	lb.	3½d. to 4½d.
Flour	ton	£8 10s. to £9 10s.
Hay, Oaten	„	£5 15s. to £6.
Hay, Lucorne	„	£2 to £3 10s.
Honey	lb.	2¼d.
Maize	bush.	2s. 4d. to 2s. 4½d.
Oats	„	3s. 2d. to 3s. 8d.
Pollard	ton	£4 12s. 6d.
Potatoes	„	£6 10s. to £9 10s.
Potatoes, Sweet	cwt.	1s. 6d. to 2s.
Pumpkins	„	3s. to 3s. 6d.
Wheat, Milling	bush.	2s. 3d. to 3s. 3d.
Onions	ton	£5 5s.
Hams	lb.	11d. to 1s.
Eggs	doz.	7¼d. to 8½d.
Fowls	pair	3s. to 3s. 6d.
Geese	„	6s. 6d. to 7s.
Ducks, English	„	3s. 2d. to 3s. 3d.
Ducks, Muscovy	„	4s. to 4s. 4d.
Turkeys (Hens)	„	6s. 6d. to 7s.
Turkeys (Gobblers)	„	12s. to 15s.

TOP PRICES, ENOGGERA YARDS, AUGUST, 1910.

Animal.	AUGUST. Prices.
Bullocks	£8 to £9 12s. 6d.
Ditto (single)	£13 7s. 6d.
Cows	£7 15s. to £9 7s. 6d.
Merino Wethers	19s.
Crossbred Wethers	25s. 6d.
Merino Ewes	19s. 3d.
Crossbred Ewes	21s.
Lambs	16s. 3d.
Pigs (Porkers)	40s.

EXHIBITION.

Animal.	AUGUST. Prices.
Bullocks (Guessing)	£28 15s.
„ (Champion)	£18 5s.
Cow „	£9 10s.
Merino Wethers	25s.
C.B. „	35s. 6d.
Merino Ewes	21s.
C.B. „	29s.
Lambs	16s. 6d.

Farm and Garden Notes for November.

FIELD.—Under ordinarily favourable conditions, harvesting the wheat and barley crops may now begin. Those who have oats for hay should cut it when the grain has formed, but before it is ripe, for then the plant is in its most nourishing condition. Destroy caterpillars on tobacco plants, and top the latter so as to throw all the strength into the leaves. Keep down the weeds, which will now try to make headway; earth up any growing crops requiring the operation; sow maize, imphee, setaria, kafir corn, teosinte, sorghum, &c. Plant sweet potatoes, sisal hemp, yams, peanuts, and ginger.

KITCHEN GARDEN.—Why do so few gardeners and farmers grow their own vegetables? This is a question frequently asked by visitors to the farming districts. The reason probably is, that vegetables require a good deal of care and attention, which means also a good deal of time taken from the ordinary farm work. In many cases it pays the farmer better to buy many kinds of vegetables than to grow them himself. The only vegetables grown on many fine farms are cabbages and pumpkins, not to class potatoes under the head. Many people have an idea that European vegetables cannot be grown during the hot summer months, but this is a great fallacy; the Chinese gardeners supply the towns with all kinds of vegetables, except, perhaps, cauliflowers, during the whole of the summer. It is, therefore, clear that, by constant work, plenty of manure, water, and some shade for seedlings, most vegetables can be produced during the hot months from November to March. If your ground has been trenched or deeply dug and well worked, the advantages will be seen during the coming months. It does not pay to work shallow-dug ground. When sowing and planting during this month, give plenty of room between the rows and the plants; otherwise they will be drawn up and worthless, and keep the ground open by constant forking and hoeing. Thin out melon and cucumber plants. It is a good plan to peg down the vines; they will then not be blown about by the wind; they will take root at intervals, and thus help the main stalk. Give plenty of water to tomatoes planted out last month. They should also be mulched. Sow cabbage, French beans, melons, lettuce, radishes, pumpkins, cucumbers, marrows, rosellas, &c.; and transplant for succession in calm cloudy weather.

FLOWER GARDEN.—Stake any dahlias which may be now above ground, and plant out the bulbs which were stored in a moist place. If the weaker bulbs are reserved, they will come in for autumn planting. Take up all bulbs which have done flowering, and store them in a dry place. Winter-flowering plants will have gone off almost; still, the garden should be in full bloom, and will well repay the trouble bestowed on it, and a little fertiliser given as a top-dressing will assist the plants to bloom and look well for a longer time than if they were neglected. Give weak liquid manure to chrysanthemums, and allow no suckers to grow till the plants have done flowering. Take up narcissi. Do not store them, but plant them at once in new situations. Sow antirrhinum, balsam, zinnia, summer chrysanthemum, calliopsis, and nemophila.

Orchard Notes for November.

The Southern Coast Districts.

November is somewhat of an off month for fruit, as the crop of strawberries is about over; pineapples, with the exception of a few off season fruit, are not ready for marketing; and citrus fruits of all sorts, with the exception of those grown in the latest districts, are now over. Bananas should, however, be improving, particularly if the season is favourable.

The most important work of the month is the cultivation of the orchard, as, in order to retain moisture in the soil, it is essential that the soil be kept in a fine state of tilth. Where land is liable to wash, breaks should be left between the fine-worked land, or, even better, a good break of cowpea or other leguminous crop, valuable for producing nitrogen and humus, should be grown. All fruit pests should be attended to; cyaniding can be carried out where necessary, and is especially useful now in the case of the Red, Purple Mussel, Circular Black, and Glover Scales. Fruit fly should be systematically fought; all infested plums, peaches, guavas, or other fruits should be gathered and destroyed, so as to prevent the spread of the pest. Sucking bugs of all sorts should be gathered and destroyed, the egg-clusters, as well as the immature and mature insects, being destroyed. Hand-gathering is as good a plan as any. Fig beetles should be destroyed by spraying with Kedzie's mixture; and the egg-clusters should be destroyed whenever found.

Bananas and pineapples can be planted during the month, taking care, in the case of the pineapples, not to set out suckers that will immediately throw out a fruit, but those that will become firmly established before they fruit. Examine the vineyard carefully, and keep it well worked. Look out for Oïdium and Black Spot, and treat for same as recommended in the Orchard Notes of the two previous months.

Early ripening grapes will be reaching maturity towards the end of the month; but few, if any, will be ripe. In any case do not market too immature fruit; rather wait a few days longer, till it is fit to eat.

Tropical Coast Districts.

The main crop of pineapples will ripen during the month; and if gathered at the right time—viz., when fully developed, but not turned colour—they will carry all right South, if carefully handled and well packed. Papaws and granadillas are still in season, and will meet with a good Southern demand; they must be packed in cases containing only a single layer of fruit, and should be sent in the cool chamber. I am certain that a good market can be got for these fruits in both Melbourne and Sydney, particularly at this time of year, when their winter fruits are off and their summer fruits are not yet on.

Watch bananas carefully for fly. Keep the orchards well cultivated.

Only ship good mangoes South; far too much rubbish is sent to Brisbane. Good mangoes will pay to pack properly, but the common sorts, which predominate to an enormous extent, will barely pay freight, if there is a good crop. The canning of good types of fibreless mangoes of good flavour is well worth taking up commercially in the North, as a ready sale for the canned fruits can be obtained.

As in the Southern Coast districts, all fruit pests should be systematically fought, and the orchard should be kept in a good state of tilth, as, once the wet season starts, there is little chance of cleaning up weeds and rubbish of all kinds, or of cultivating and sweetening the soil.

Southern and Central Tablelands.

The earlier kinds of summer fruits, such as cherries, will ripen during the month. See that, if fruit fly makes its appearance, it is systematically fought.

Look out for Codling Moth, and continue the sprayings with Kedzie's mixture.

Look out carefully for any San José scale that may have escaped the winter spraying, as, if the trees are sprayed whilst the young are hatching out, the bulk of the insects are killed and little damage is done either to the tree or fruit.

The sulphide of soda spray is one of the best to use now. Keep Woolly Aphis in check, should it make its appearance, using the resin washes; or, if it and San José Scale are both present, use the sulphide of soda spray.

Watch the vineyards carefully for Black Spot and Oïdium. Keep the orchard and vineyard well cultivated, so as to retain all the moisture in the soil required for the growth of the tree and development of the fruit. In the warmer parts, irrigate when necessary, following the irrigation by deep and systematic cultivation.

See that grape vines have plenty of foliage to protect the ripening fruit from sun scald, but yet not so dense a foliage as to induce Oïdium or Black Spot. Look out for Red Scale on citrus trees, and cyanide to check same. Look out for fruit fly in the early ripening fruits, and gather and destroy all that may be so affected.

Agriculture.

ONION-GROWING.

Although some five or six months will elapse before the regular time for sowing onion seed, it may yet be of advantage to new settlers on the land to publish a few notes on the cultivation of this crop. There is no reason why Queensland should import onions from the Southern States or from Japan, seeing that, with only ordinary care, heavy crops can be produced on suitable soils in the coastal and in parts of the south-eastern inland districts.

THE SOIL.

The most suitable soil is a rich light loam (it cannot be too rich), if possible overlying a gravel subsoil, as the onion will not stand stagnant water at the roots. There must then be good get-away for surplus water in rainy weather. In other words, the land must be well drained. When the soil consists of a heavy loam, it must be rendered free, friable, and easy to work. In such a soil the onions will be quite a month later in ripening than on a lighter, sandier loam; but they will be firmer than those grown in the light soil, and consequently be more suitable for carrying to a distance. An eastern or south-eastern aspect has been proved to be better for the crop than if the land sloped to the west, as the onion does not require intense heat to bring it to maturity; but it does require the morning sun, and shelter from westerly winds.

Before sowing the seed, it is important that the seed-bed be clear of weeds and of their fallen seeds. The bed should, therefore, be dug up and exposed to the weather for some time previous to sowing. Then, when any weeds appear, give the land a good scuffling, and repeat the operation two or three times between February and April. There will be little trouble from weeds afterwards. This applies both to the seed-bed and to the land proposed to be planted out. Seed-beds should not be wider than from 4 to 6 ft.; and if the seed is sown in the field, it should be drilled in, the drills being not less than from 16 to 18 in. apart. The seed should, in the latter case, be dropped about 2 in. apart, and covered to a depth of about 1 in. This will require 2 lb. of seed per acre.

If sown too deep, many seeds fail to germinate, and most of those that do appear will make an abnormal growth of neck. The writer has raised a full complement of plants on a seed-bed where the seed was merely covered with a light covering of wood ashes sifted over them. This was, however, in a wet season.

In from nine to twenty days the young plants will appear. They come up looped, resembling a blade of grass.

The best time to sow onion seed is in March and April; and the young plants, if the season be favourable, will be ready to plant out about June. Before pulling them up, water the bed well. Then cut off a little of the tops and some of the roots. If this is done, they are easier to plant, and strike better. When preparing the soil either for planting out or for sowing direct, first prevent the growth of weeds as above directed. Then double plough it by going twice in the same furrow down to 15 or even 18 in. Then harrow well; roll so as to break all the clods; then let it lie a month, after which rake it up with a horse hoe to the depth of 6 in.; harrow down level, and work the ground to a very fine tilth. Finally, roll it down to ensure a firm seed-bed, and then sow the seed. This is best done with a Planet Junior combined drill, which will open the drill, sow the seed, cover it, roll it down, and work the next drill—all in one operation. Be especially careful to run the drills straight, or the crop will be cut when machine-hoeing.

The drills should be, as already said, from 16 to 18 in. apart, and the seed 2 in. apart, although on rich soil they may be 6 in. apart. When planting out is resorted to, the drills should be slightly elevated, and the *roots* of the plants firmly embedded in it, so as to allow the bulb to, as it were, squat on the surface, not under it. As the plants grow, the soil must be kept perfectly clear of weeds; and where the working of the soil has thrown it against the bulbs, it must be drawn down so that the roots only are in the soil.

Go through the rows very carefully with the machine hoe as often as weeds appear, once the plants are large enough to allow the rows to be followed, straddling the rows. For the first six weeks this will require to be done about every week. At the same time any weed in the rows should be pulled out by hand. At six weeks' old the onions should be large enough to be thinned out, say, to 6 in. apart for White Barlatta and 4 in. for Brown Spanish. Fill up at the same time any gaps there may be in the rows by transplanting. Onions should not be transplanted during a cold westerly wind. Wind perishes them quicker than a hot sun.

After six weeks, the plants will be too large to straddle. Then both hoes may be used in the same row, and one hoeing every three weeks will be sufficient to keep the ground loose and open.

By September the onions will be too large to admit of the use of a machine; and there will be no need to do any more in the way of cultivation, as the leaves now entirely cover the ground.

Should any seed heads appear, they should be at once broken out, as they destroy the bulb by making it pipey.

Onions may be known to be ripe by the dying back of the tops. This will happen about November. Then take them up by hand, and leave them on the ground between the rows to dry. As soon as they are dry, clean them and carry them, with as little bruising as possible, to the barn. Spread them out thinly on saplings, so that the air can circulate through them. In two or three days they will be dry enough for market. Do not spoil the market by bagging them before they are fit. About 70 or 80 lb. is sufficient to put into each bag. As the harvesting cannot all be done at once, owing to some bulbs ripening before others, it will take quite six or seven weeks before the whole crop is off.

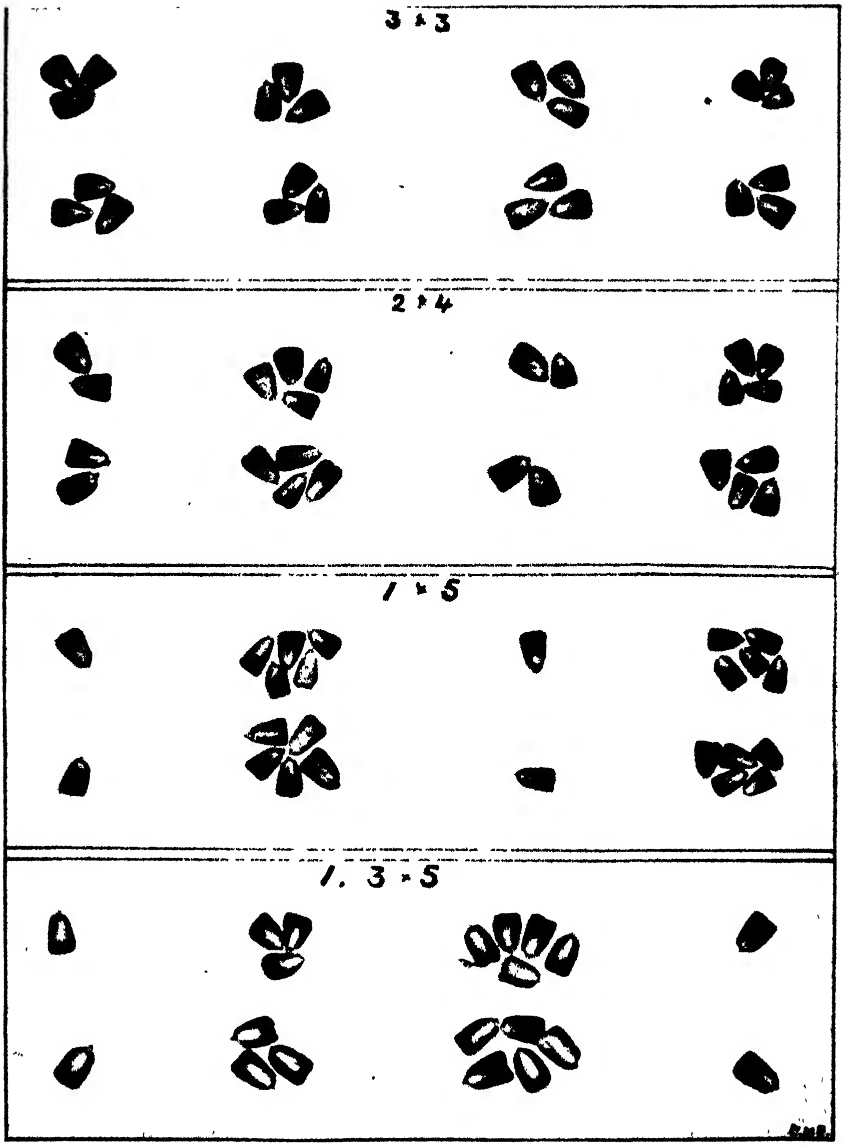
Just a word or two about onion seed. Always obtain fresh seed, as old seed loses its germinating powers. Good seed should germinate in at most a week.

Onions are very liable to sprout when bagged or stored in the barn. It is no uncommon thing to see bags of onions offered for sale in the markets which have not only sprouted, but have even begun to decay. This is almost entirely due to bagging them before they are thoroughly dry. The onion-grower should frequently look them over after storing to sort out the bad ones.

It is not advisable to grow the very large varieties which used to be favoured in by-gone days. There is a better market for the medium-sized Brown Spanish, Brown Globe, Yellow Globe, and Silverskin; the latter is of a beautiful silvery white, and is amongst the earliest. The Brown Spanish and Brown Globe have excellent keeping qualities. White Spanish and Yellow Globe are above medium size. The Mammoth Silver King is a very large variety, single bulbs often weighing 3 lb. They are very sweet and mild, white in the flesh, good keepers, rather flat in shape; they also mature early. The largest of all varieties is the Record Mammoth, a variety introduced from Madeira. Should the plants shows signs of developing thick necks, which will be owing to the soil being heaped against them during cultivation, the remedy is to wring the necks of the plants, or, at least, to bend them down with a twist. This will have the effect of inducing the formation of bulbs.

A very useful small onion to grow is the Spring onion, which can be used for the table at from two to three months' old. It comes to maturity in from five to six months, and as soon as it is ripe may be taken up and treated as in the case of other onions.

Plate XVII.



Figures Showing Plan of Distributing Seed in Plats where Different Methods were Discussed.

HOW TO CONDUCT A MAIZE-BREEDING PLAT.

The maize-grower in Queensland is not much given to making experiments with a view to either increasing the yield per acre or with the object of evolving a finer cob carrying more rows of deep, evenly-sized grain. Such work is, however, done for them at the various State Farms, but in America, where corn is "king," experiments are made all over the corn belt, not only by the Agricultural Bureaux, but by the farmers themselves. Here is a leaflet from one of the numerous publications so lavishly distributed by the Department of Agriculture throughout the States. There does not appear to be any insuperable difficulty in making small but valuable experiments, as the following directions will show:—

As there is considerable inquiry at present regarding methods of corn-breeding, it seems best at this time to outline a plan which experience so far seems to recommend.

VARIETY TO USE.—Select some variety well adapted to the region, and a good yielder. This is important, as one might spend years working on a poor variety and in the end have nothing better than the best variety already existing. It may be best to do some preliminary variety testing.

SELECTING THE EARS.—If yield is to be the principal object of selection, it will not be necessary to stick closely to some one type of ear. In fact, since we do not know definitely what particular type of ear in a variety may do best in a new locality, it would seem wise to select several types, the main consideration being that the ears are sound and well matured.

NUMBER OF EARS TO SELECT AS FOUNDATION STOCK.—Exceptionally good ears are not common, probably not more than one in every 50 to 100 ears. Therefore, if one starts with only a small number of ears, 25 to 50, he may not find a single exceptional yielder in the lot. Not less than 100, and better 200 ears, should be tried out in the preliminary trial.

THE TEST PLAT.—Great care should be exercised in securing a uniform piece of land for the test plat, as everything depends on being able to compare in an accurate way the yields of the different ears The land should not be exceptionally rich but only of the average fertility of the region If the land can be ploughed twice—say fall-ploughed, then backset in the spring—and disked several times, it will do much toward equalising conditions.

SIZE OF PLAT.—One-half an ear will plant a row 16 to 20 rods in length. However, there will be less error if the rows are duplicated, and it is best to plant two rows 8 rods long from each ear. One hundred ears will make 200 plats 8 rods long. This will take a piece of land 32 by 11 rods or 16 by 22 rods; or two test plats one-half this size on different parts of the farm may be used, duplicating the experiment in each.

CHECK PLATS.—No matter how carefully the land is selected, it may lack uniformity, and for this reason "check plats" should be planted with a uniform lot of corn. We have found making every fifth plat a check very satisfactory. The simplest way is to make a check of every plat that is a multiple of 5; as, 5, 10, 15, &c.

PLANTING THE EARS.—The land should first be laid off by a marker into checks 3 ft. 8 in. apart. The planting must be done by hand. Carry the ear, and shell off the grains as needed. It is best to plant four grains per hill; then, when the corn is 6 in. high, thin down to three. This will give a perfect stand. *Every precaution should be used to secure uniform conditions in each plat, or else the experiment would be a waste of time, as the results would not mean anything.*

CULTIVATION.—Ordinary cultivation, taking care that none of the rows are unduly injured.

TAKING NOTES.—Some breeders prefer to keep extensive descriptive notes for their own information, but for practical results very little note-taking is necessary other than accurately to secure camparable yields. Of course, if

the breeder is selecting for some particular quality, such as earliness, height of ear, angle of ear, &c., he must take notes on these points. Also taking a set of notes on each individual row furnishes the very best training possible in close observation; and as a man cannot know too much about the corn plant in order to be a successful breeder, it will usually pay him well to keep as complete a record as possible. Following is a set of the notes kept by the Experiment Station. The breeder can pick out such of these as seem best in his case.

NOTES ON ORIGINAL SEED EARS.

No. of Ear	Weight of Ear.	Weight of Grain.	Weight of Cob	Per Cent of Grain.	Per Cent. of Cob.	Length of Ear.	Circum. of Ear.	Rough or Smooth.
...	Ounces.	Ounces.	Ounces.	..	...	Inches.	Inches.	...

NOTES ON CROP FROM THESE EARS.

Date of Planting.	Germination.	Date of Tasseling.	Height of Stalk.	Height of Ear.	Per Cent. Suckers	Per Cent. Barren Stalks.	Weight of Leaves.
..	Per cent.	..	Feet.	Feet.	...	...	Ounces.

NOTES CONTINUED.

Weight of Stalk.	Yield per Acre.	No. Ears per Plat.	Average Weight Ears.	Average Length of Ear.	Ratio Weight Ears to Length.	Per Cent. Grain.	Indentation.
Ounces.	Bushels.	...	Ounces.	Inches.	..	...	

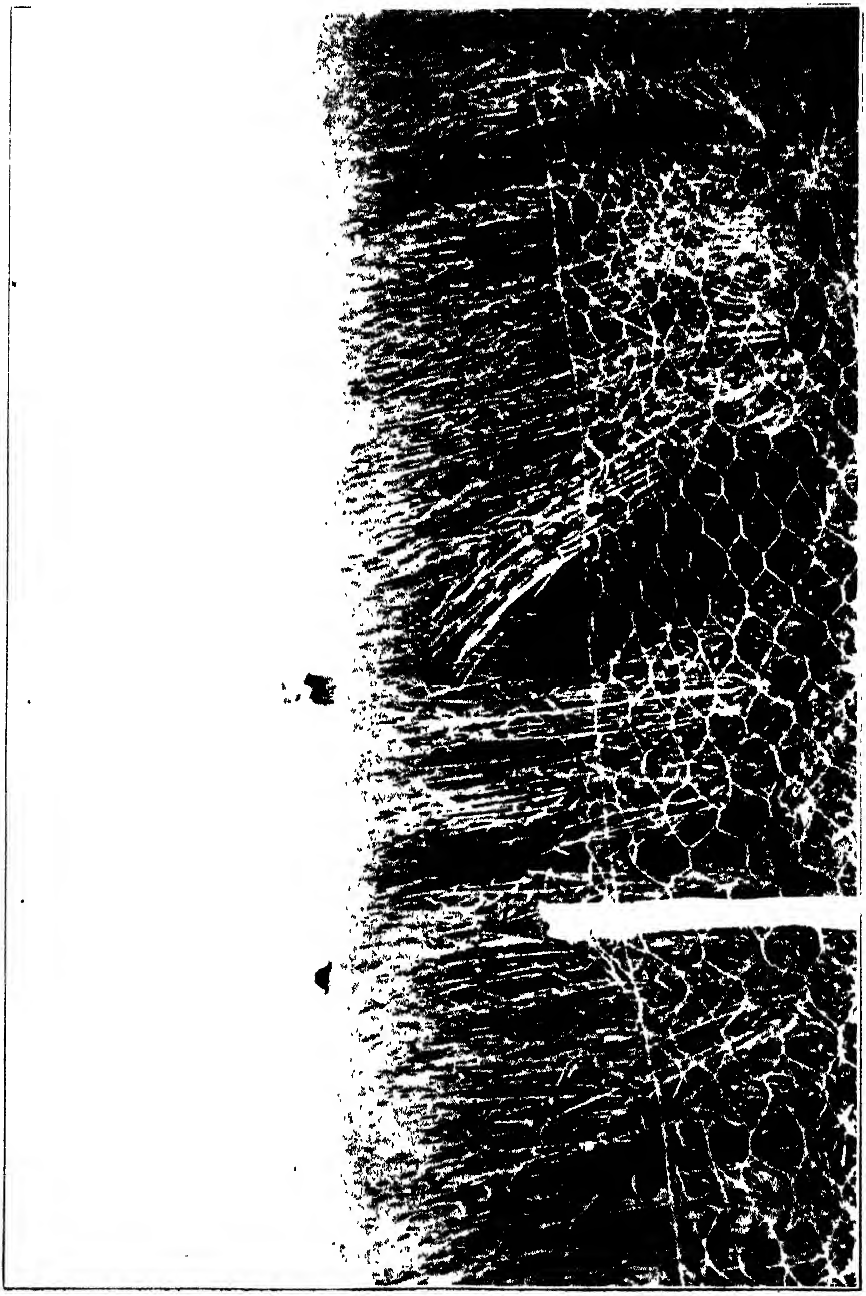
HARVESTING.—When corn first ripens, it contains 25 to 30 per cent. water, but slowly dries out to about 15 per cent. In the breeding plats some rows ripen and dry out sooner than others; hence, the weights will not be comparable until all are equally dry. For this reason we have found it best to leave the breeding plats in the field for six to eight weeks after ripening, or till about 1st December. Any very late maturing or slow maturing rows should be noted and discarded at harvest, as we do not want a type that will not mature well.

A very good method of harvesting the plats is to divide a wagon-box into two to four compartments. Then husk a plat into each compartment. At the end of the rows have a platform scale with a box large enough to hold the corn from one plat. Scoop the corn into this box, and as each plat is weighed dump the corn at the end of the row, leaving the plat stake with each pile.

Leave the corn in these piles until all plats are husked, then mark the piles from high yielding rows. A careful examination can now be made of these piles to note whether any of the piles seem immature, low in vitality, or otherwise undesirable. About one-fourth of the best plats should be noted —that is, 20 to 25 out of 100. From these, seed for the general crop may be selected for the next year.

The breeder still has one-half of the original ears from which the crop was grown. It is from these that he will build up his improved strains of corn.

Plate XVIII.



WHEAT AT GINDIE STATE FARM

UNIFORM DISTRIBUTION OF THE SEED IN PLANTING COMPARED WITH A VARIED DISTRIBUTION.

In 1907 an experiment was planned to test the value of distributing the seed at a uniform rate of three grains per hill as compared with distributing the seed in different amounts per hill, but planting the same number of grains per acre. The object of this experiment was to see whether, in planting corn, it would be necessary to have an absolute uniform drop of three grains per hill, or whether a reasonable variation would affect the yield. The first plat was planted uniformly—three grains per hill; in the second plat, two and four grains per hill were alternated; the third plat was alternate one and five grains per hill; and the fourth plat one, three, and five grains alternate per hill. All plats were hand-planted; the desired number of grains dropped in each case, just as would be done by a machine. The hills were 3 ft. 8 in. apart each way, and the variety used was Hogue's Yellow Dent. Plats were duplicated each year and check plats placed on both sides of each series.

DISTRIBUTING SEED IN PLANTING IN VARIOUS WAYS AND EFFECT ON YIELD.

Grains Planted per Hill	Yield Per Acre.		
	1907.	1908	Average
	Bushels	Bushels	Bushels.
3	71 2	58·9	65 5
2 and 4	70·4	56·9	63 6
1 and 5 . .	64·5	60 6	62·6
1, 3, and 5	70 7	60·1	65·4

A uniform distribution of the seed gave slightly better results than an uneven distribution. The variation in kernels per hill is much greater than would result with a corn-planter even if dropping very unevenly. The data, therefore, indicate that ordinary variation in rate of dropping found in corn-planters will have very little and probably no effect on the yield per acre.

AGRICULTURE IN THE PHILIPPINES.

Queensland, being partly situated in the tropics, where all products of the torrid zone thrive well, is naturally interested in many products of tropical countries; and hence we endeavour to place before our readers whatever of interest to our tropical agriculturists we may note in the journals, official and otherwise, which are received by the Department of Agriculture and Stock. Amongst our valuable exchanges may be mentioned the "Philippine Agricultural Review," issued by the Director of Agriculture at Manila, which usually contains some valuable articles on such tropical products as hemp from the *Musa textilis*, rubber, coffee, cacao, &c.—all of which, it is hoped, will be in the near future produced in commercial quantities in Northern Queensland.

The "Mindonao Herald," published at Zamboanga, Mindanao, also contributes largely to our knowledge of what is being done in the matter of agriculture in the Philippines; and that journal has now determined to regularly publish agricultural notes which will embody all such crops as can be raised in the islands with profitable results. In the issue of the "Herald" for 13th August, we note with surprise that the cultivation of corn (maize) is greatly neglected in Moroland. There is considerable demand for maize, especially in the Davao Gulf, where the farmers are too busy producing hemp to trouble themselves about maize. It appears that three crops of maize can be

raised during the year, the average return being 17 cavans (2,091 lb.) or about 35 bushels per acre. The market price is 2·50 to 3 pesos per cavan, or about 5s. 3d. to 6s. 3d. per bushel.

No use has yet been made of green maize as fodder; and as for ensilage, well, probably, there are no prolonged droughts in the Philippines which would necessitate the utilisation of crops in this manner. The present method of planting maize by natives is primitive; but here, in Queensland, much the same plan has to be adopted on newly-cleared scrub land, with the difference that the Queensland scrub farmer plants his seed with a hoe instead of with a stick. The yield of maize this year in all parts of Queensland has been phenomenal, ranging from an average of 60 bushels to 135 bushels of shelled grain per acre, with the result that the price of maize fell from 4s. per bushel at the beginning of the season to 2s. 4d. later on.

THE HUMAN SIDE OF TWINE.

SISAL *v.* MANILA BINDER TWINE IN CANADA.

When we drive home from the implement dealer with our little load of Sisal twine for the coming harvest, we do not often realise that we are giving that twine its final lift on the journey of many thousands miles which it has taken months to make. Seldom do we appreciate when we give it its final resting-place in the binder box that the first hands which touched it were those of a Maya boy or girl in far off tropical Yucatan, whose ancestors were a great civilised people, with temples and literature, centuries before Columbus came ashore in his red velvet suit.

Or, if it is Manila twine, the first step in its long pilgrimage was under the guidance of a bare-footed brown-skinned little Filippino savage, who perhaps never heard of a binder, and whose views of agricultural implements are a pointed stone or a crooked stick.

Yet, if it were not for the industry of these two widely separated nations, the farmers of this rich State would still be obliged to bind their grain with old-fashioned wire, which never worked, or with untrustworthy cotton strand. In fact, the problem of twine was the problem of successful binding for years after the self-binder was an established fact.

It took many years and thousands of dollars to eliminate this primary drawback to the early grain-growers of the country. One manufacturer alone spent 15,000 dollars trying to make twine out of grass, 35,000 dollars using paper as a substitute, and 43,000 dollars on straw—all in the end to be discarded as unsatisfactory. Then, after searching the world with a close-tooth rake, as it were, it was found that two fibres could be made to do the work—Manila and Sisal. The Manila—long, soft, and even—had generally been used in multiple strands for making cable and cordage; while the Sisal—strong, pliable, and smooth—was found to lend itself perfectly for the manufacture of a single-strand cord, such as the self-binder necessitated.

Then commenced a merry struggle between the distant races for the honour of supplying the twine which was to make His Majesty the American farmer the greatest food-producer in the world. At first, owing to the established position of the Manila hemp trade caused by the cordage industry, the little brown brother in the Philippines forged ahead, but he made no progress in his methods of production, using the knife and block and other simple methods followed by his primitive forefathers in extracting the fibre. It was soon seen that Sisal would either be the ultimate material to supply this demand or the demand would not be filled. At this point of the race a number of clever, aggressive Yucatecans, educated in the sciences in this

country and abroad, sprang into the game. They saw the future commercial possibilities of the neglected Sisal plant. At their own expense they built railroads into the arid, dry territories where henequen grew. They invented new machines, capable of cleaning 100,000 leaves a day, and soon began to compete on an equal basis with the Manila fibre.

The Spanish-American war temporarily advanced the price of Manila fibre to such an extent that good grades of Manila fibre commanded a price which was practically prohibitive for binder twine. Therefore, manufacturers of binder twine concentrated their energy and genius in the production of a perfect binder twine from Sisal. This required some adjustment of machinery and some change in methods, but manufacturers of twine succeeded so that the twine made from Sisal has for some years been as perfect and satisfactory as any binder twine ever made from any material. This has resulted in the increased use of Sisal, until during the past season not less than 85 per cent. and possibly 90 per cent. of the material which went into the manufacture of binder twine in the United States was Sisal fibre.

First-class binder twine can be made from high-grade Manila fibre, but it is very difficult to make even a reasonably good article of binder twine from low-grade Manila. Before the American occupation of the Philippine Island, the Spanish officials at times exerted their arbitrary power for the purpose of maintaining the quality of the fibre which was produced by the natives. It was not an uncommon thing for the governor of a district to seize a quantity of inferior fibre and publicly burn it in the middle of the plaza. This was an object lesson to the natives to produce better grades of fibre However, since the Americans have taken possession of the Philippine Islands, no authority has been exercised and no influence exerted by the officials in connection with the quality of fibre. The result is a very much greater proportion of low-grade fibres than has ever been produced in previous years. Unquestionably, large quantities of this low-grade fibre will be used in the manufacture of binder twine for the harvest of 1910, and it is unnecessary to state that those who attempt to use twine made from this low-grade Manila fibre will have troubles of their own.

It is to the farmers' interest always to keep a weather eye on the future, and in this particular instance to secure his twine supply, whether it be Sisal or Manila, at as early a date as possible.—" Nor'-West Farmer."

CUT WORMS AND TOBACCO.

Mr. R. S. Nevill, Tobacco Expert, says that the following remedy (taken from "The Western Tobacco Journal") might be tried on beds to prevent the stem grub, as it is simple and cheap:—"A new and what is believed to be an effective preventive method to circumvent the ravages of the troublesome cut worm has been discovered by an Orfordville (Wis.) tobacco-grower, which is so inexpensive and simple that it ought to commend itself to very general use. Here it is: Add to each barrel of water used in the transplanting about 5 oz. of ordinary carbide, such as is used in the making of gas for lighting plants, autos, &c., making the water so offensive that it is alleged that worms will not go near the plants. The remedy works so well that the discovery has been given the State experiment station for further trial, and it is believed that bulletins will be issued commending it to general use. The grower who first made use of this mixture says it is a sure cure. At any event, it is worth a trial. If all that is claimed for it is true, the discovery may become a great help to the tobacco-growers of the entire country."

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF SEPTEMBER, 1910.

Name of Cow.	Breed	Date of Calving	Total Milk	Average Test Per cent.	Commercial Butter	Remarks.
			Lb.		Lb.	
College Lass	Ayrshire	27 Aug., 1910	1,378	4·1	63·21	
Mona	Grade Holstein	14 Aug. ,,	1,331	3·9	57·91	
Auntie	Ayrshire	8 Aug. ,,	1,188	4·1	54·49	
Glen	Grade Shorthorn	21 July ,,	984	4·4	48·60	
Honeycomb	Shorthorn	25 June ,,	996	3·9	43·34	
Nancy	Grade Shorthorn	10 Aug. ,,	962	4·0	42·99	
Lubra	Grade Jersey	17 Mar. ,,	714	5·0	40·30	
Remit	Holstein	8 July ,,	868	3·9	37·77	
Peewee	Grade Holstein	22 Aug. ,,	825	4·0	36·87	
Daisy	Holstein	29 Dec., 1909	830	3·6	33·20	
Nita	Shorthorn	24 Jan., 1910	651	4·4	32·15	
Butter	,,	14 Aug. ,,	708	4·0	31·64	
Carrie	Jersey	26 Feb. ,,	608	4·4	30·03	
Cuckoo	,,	8 July ,,	636	4·2	29·92	
Cocoa	,,	29 Apr. ,,	635	4·2	29·87	
Lemonade	Grade Guernsey	25 May ,,	584	4·5	29·53	First calf
Orange	,, ,,	13 Dec., 1909	522	5·0	29·46	
Eve	Jersey	1 Nov. ,,	607	4·3	29·27	
Norma	Shorthorn	15 July, 1910	676	3·8	28·62	First calf
Tiny	Jersey	30 July ,,	601	4·2	28·27	

Fed for first half of month on green lucerne.
Fed for second half of month on green barley and field peas.
Cows allowed to have the use of paddocks with natural grasses, but paid little or no attention to them whilst artificially fed.

CAMEMBERT AND OTHER SOFT CHEESES.

Hard or pressed cheeses have for many generations been manufactured in this country, and are well known everywhere, but until recent years little has been heard concerning another type of cheese, properly called *soft cheese*.

No country has been so successful in the manufacture of soft cheeses as France, whence we obtain nearly all the delicate and refined varieties. To a certain extent the climate may be responsible for the great success of French cheese-makers; but given favourable conditions as to climate and locality, such as prevail in the south and south-western districts of England, and the presence in the dairies of the necessary moulds and bacteria, there is no reason why really good soft cheeses should not be made in Great Britain. It has, in fact, been proved that cheeses can be made equal in all respects to the best French produce, especially in the South Midlands and the south and west of England, which possess a moderately equable climate very similar to the soft cheese-making districts of France.

The production of soft cheese is especially to be recommended to small farmers and to others who have small quantities of milk available, particularly when they are situated near populous centres or watering-places in the southern parts of England. The demand for soft cheese in the North Midlands or northern districts of England is not great.

The chief obstacle in the way of successful development of the soft-cheese industry lies in the difficulty of controlling the ripening so as to make the produce uniform. Even in the localities where these cheeses are made in France, the quality may vary greatly; hence it is necessary for the prospective cheese-maker to acquaint himself with the conditions desirable, the various rooms required, and the temperature at which each should be maintained.

In general, three rooms are necessary—(1) a *making-room*, in which th milk is coagulated, drained, and formed into cheeses; (2) a *drying-room*, where the cheeses undergo the first stages of ripening; and (3) a *ripening-room* (or cellar), kept at a low temperature, in which the cheeses undergo the final process of ripening and refinement. The temperature, moistness of the atmosphere, and ventilation differ in each of these rooms; and unless the maker is fully acquainted with the conditions which should prevail in each, his attempts at manufacture will almost certainly end in failure.

Fortunately, however, it is not difficult to adapt to the purpose of soft-cheese making the buildings usually found in small homesteads. The *making-room* need not be large, but should be provided with means for artificial heating so that the apartment can be kept at a constant temperature. The *drying-room* should be in such a position and so constructed that the temperature and ventilation can be regulated at will. Thorough ventilation with means of controlling it is absolutely necessary in the drying-room. The final *ripening-room* should be moist, and not subject to any great variations in temperature.

The refined soft cheeses most popular are the Camembert and Brie.* The Pont l'Evêque cheese is also well known, and, though it is usually considered a soft cheese, the mode of manufacture and ripening differs somewhat from that of the true type of soft cheese, the ripening not being due to mould growth, but depending largely upon the enzymes of rennet, a comparatively large quantity of which is used in the coagulation of the milk.

It will be wise on the part of the maker to specialise in one variety of cheese only, as each variety described below requires a different degree of temperature, moisture, &c., in the different stages of manufacture.

As generally understood, soft cheeses are small, non-pressed, and quickly ripened, and are frequently so soft as to be spread upon bread like butter. Usually they are made from perfectly sweet milk, and development of acidity takes place in the milk after the rennet has been added, or in the curd whilst draining and before the application of salt. On the other hand, with the hard or pressed type of cheese the milk is partially soured or ripened before the addition of rennet, and all the acid necessary for securing the correct type of cheese is developed before the curd is salted or placed in the hoops or forms in which they are pressed.

Soft cheeses, though each variety may be made in a special manner, all agree in one particular—namely, that the whey is never fully drained from them. The coagulated milk is usually ladled into forms or metal hoops, and the cheeses allowed to drain naturally. They are not subjected to heat or pressure, and consequently contain a much larger amount of water at the beginning of the ripening stage than do hard cheeses. As a consequence of this soft and moist condition, they afford favourable conditions for the growth of various micro-organisms and fungi, and enzyme action occurs more readily than in the pressed or hard varieties of cheese.

The action of these groups of fermentation agents ripens the cheeses rapidly and develops high flavours, as in the Camembert, Brie, and other varieties. Certain moulds which form readily upon the surface of these cheeses play an all-important part in the ripening process.

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* A description of Brie, Pont l'Evêque, and other soft cheeses will appear in next month's issue.

These moulds are aerobic, and the ripening propagates itself from the surface to the interior. The breaking-down or ripening of the curd is due in most cases to the production of unorganised ferments or enzymes; but the flavour, texture, and appearance of the curd are different for different varieties of cheese, depending largely upon the methods of treating the curd, the quality of the milk, and the conditions in the ripening-rooms.

From the foregoing remarks it will be gathered that the ripening of soft cheeses is due to the presence of certain moulds and bacteria, and it is a fact that the maker never produces a Camembert or Brie cheese of correct texture or flavour unless he is able to grow upon the surface certain types of moulds. In the ripening of the cheeses the mycelium (or "roots") of these moulds penetrates to a short distance into the surface of the cheese and secretes enzymes, proteid digestive materials which gradually bring about changes of a digestive nature in the raw curd, this action being equivalent to ripening. In the true type of ripened soft cheese, such as Camembert, the ripening proceeds from the surface towards the centre. Beginning at the outside, there appears a change of the hard raw curd into a softer buttery material, and if the cheeses are properly made this slowly extends to the centre, and in from three to five weeks the ripening process will be complete.

It is necessary for the luxuriant propagation of the desired moulds that the curd should at the outset be highly acid. Unless the curd is sufficiently acid or sour at the time of salting, the mould will never afterwards grow properly, but, if the making-room is kept at a sufficiently high temperature during the draining process, the cheeses are certain to attain to this condition before the application of salt, which to a great extent stops the development of acidity. The acidity should, however, be allowed to develop naturally. If starters of lactic-acid bacteria are used in soft-cheese making—as in cheddar-making—the development of acidity will be too rapid during the first stages and the curd will drain quickly, becoming hard and dry, and will not contain sufficient moisture for the growth of the desired moulds. The only ripening material admissible in the manufacture of soft cheeses is a mixture of a little of the ripe cheese—which contains the spores of the moulds or fungi—with water or sweet whey, and this is introduced into the milk before renneting. (The preparation of this form of starter or inoculating material is dealt with on p. 376.)

METHOD OF MAKING CAMEMBERT CHEESE.

The Camembert is a French variety of cheese, and in France is usually made from whole milk of a quality similar to that given by Shorthorns; often, however, separated or perfectly sweet skimmed milk is mixed with the new in the proportion of 1 to 5. This cheese is usually made from September to May. During the summer months its manufacture should not be attempted, as the cheese does not then ripen properly. In summer the Camembert gets too soft, and has an offensive smell, and the demand in summer is for a soft cheese of a fresh or unripened type. The cheeses are small—about 4½ in. wide and 1¼ in. thick—and weigh from 10 to 13 oz. About 5½ gallons of mixed new and skim milk are required for each dozen cheeses. Camemberts are usually sold retail at 7d. or 8d. each, and the maker realises a really good price for the milk used in their manufacture.

The milk is received uncooled direct from the cow. Milk that has been cooled does not make good Camembert cheeses. If separated milk is added, it should be perfectly sweet and fresh and free from froth. The milk is strained into wooden tubs provided with close-fitting lids; tubs of a correct size hold 6 gallons each. Metal vessels should not be used, or the outside portion of the curd will get chilled, and this chilled and soft curd causes irregularity in the cheeses afterwards. A 6-gallon setting-tub will hold sufficient milk to make two dozen cheeses if the two-curd system, which is the best,

be employed. The cheeses are sometimes finished at one operation, but the two-curd system is preferable—half of the curd being filled into the moulds in the evening, and the other half the following morning.*

The milk is usually renneted at a temperature of from 80 degrees to 82 degrees Fahr., and ½ c.c. of rennet of a standard brand per gallon of milk is added so as to produce perfect coagulation in from 2 to 2½ hours. The rennet should be mixed with six times its volume of water and be thoroughly stirred into the milk.

The milk is stirred gently and carefully at first to prevent the rising of the cream. If the cream be allowed to rise during coagulation, it will show in streaks in the body of the cheese, and any of the creamy substance appearing on the surface of the cheese will fail to mould satisfactorily.

To introduce the proper moulds and ferments into the cheeses, and into the dairy where soft cheeses have not previously been made, it is advisable to inoculate the milk with what is termed a "starter," which is introduced before renneting.†

The curd when ready is ladled out into forms or hoops of metal 4½ in. in diameter and 4½ in. high. These hoops rest upon straw mats placed on an inclined and grooved draining-table, made in such a form that the whey readily drains away.

The ladle used should have a sharp cutting edge and go easily into the hoops. Before ladling out the curd, it is well to pour a little warm water into each hoop, as this produces a better face upon the cheeses. The cheeses are then left overnight, twenty-four of the half-cheeses having been made from 5½ gallons of milk used. By morning they will have drained to about two-thirds of their original dimensions. In the morning a similar quantity of milk is taken and treated as described, but before ladling out the morning's curd the surface of the first portion of the cheese should be carefully broken up with a wooden spatula to admit of the two curds joining properly; unless this be done, the cheese is liable to break in half. In ladling out the morning's or second half of the curd, it is important that the last slices be placed upon the surface of the cheese in an unbroken condition; to ensure this, a little curd with which to finish the cheeses should at the outset be placed on one side.

The cheeses are now left to drain in a temperature of not less than 65 degrees Fahr., and when the two curds are approximately thirty-six and twenty-four hours old they should be more than half-way down the hoop and firm enough to admit of turning. The turning of the cheeses is rather a delicate operation, and requires much practice before it can be skilfully

* The two-curd system is considered preferable for the following reasons:—If made of two curds the cheeses drain better, and there is less loss through oozing of the curd from the forms or hoops. There is also no need to wait for the curd to settle and chill before the hoop is completely filled. If the moulds are altogether filled at one operation, the lower portion of the curd is subject to too much pressure, and irregularity in the moisture content of the cheese will ensue. Another most important point in favour of the two-curd system lies in the application of salt. It is necessary to salt these cheeses twice with an interval of six or eight hours between each salting. If the cheeses are made in two operations, the lower or older portion is turned up and salted first, and by the time the salt has dissolved the newer surface will be ready to be salted and it will then be almost identical as regards age, acidity, &c., with the first-made curd; whereas if the cheese has been made of one curd only and an interval allowed between the salting of the two surfaces—which, if the salting is to be properly accomplished, is absolutely necessary—then it follows that the top and bottom will differ in acidity, and one side of the cheese will ripen differently from the other. In cheeses made of one curd only it is often found that the last salted side fails to mould and ripen at all, because it has been too sour and draining has proceeded too far.

† This culture of the desired ferments, &c., is made as follows:—Take a small portion of curd, say ½ oz., from just below the crust of a really good half-ripe Camembert. Macerate this piece of curd and add it to half a pint of distilled water or sweet whey at a temperature of about 80 degrees Fahr. Stir occasionally until the curd has thoroughly dissolved and then strain into the milk from which the cheese will be made. Stir the milk for a while so that the ferments get properly distributed before the addition of rennet. This inoculation of the milk should be repeated for a few days or until the cheese-rooms and utensils get thoroughly permeated with the ripening ferments. Afterwards if conditions are favourable the mould will make its appearance upon the cheeses naturally.

performed. The maker, deftly putting his left hand under the cheese without removing the hoop, inverts the whole, steadying the cheese meanwhile with his right hand and placing it face downwards upon a fresh straw mat. The upturned surface of the cheese should present an unbroken grooved appearance due to the straw upon which it has been resting. Sometimes the cheeses settle too rapidly. This is due to the milk being out of condition—a little sour, perhaps; or the making-room may have been kept at too high a temperature. At other times the cheeses fail to drain or settle sufficiently; when this is the case, the temperature has usually been too low at renneting, or the temperature of the room may have been too low. Cheeses which drain slowly are usually fermented and spongy, the excess of moisture setting up abnormal fermentation. Such cheeses are never good. They are nearly always slimy on the outside, and a slimy cheese will never mould or ripen properly.

The salting of the cheese takes place when the curd has shrunk a little from the sides of the hoops, and the upper and older surface is salted first with fine dry salt spread evenly, about ½ oz. being used for each cheese. After thus salting the upper face only, the cheeses are left for 6 to 8 hours in the hoops, when the second salting takes place. The hoops are removed, the cheeses turned and held in the palm of the left hand, salt being applied to the new upper surface and to the sides, the latter being rubbed heavily with salt. The cheeses should then be placed on sparred shelves in the making-room and turned twice daily. When they begin to show the growth of a fine white, rather pilose or hairy mould, evenly distributed, they are removed to the drying-room. Up to this stage all the processes have been carried out in the making-room.

The drying-room is an apartment with preferably a northern aspect, and so constructed as regards ventilation that currents of air can be directed upon the cheeses in all directions. Provision is made for artificial heating, and the slides and windows are so constructed that they can be opened and shut at will. The room should be kept at a temperature of from 54 degrees to 56 degrees Fahr., and not be too dry. If the conditions are favourable, the Camembert mould will grow rapidly, and in course of time blue tints will appear upon the extremities of the white mould, and the cheeses generally will assume a greyish-blue appearance. When this point is reached, the cheeses must be removed to the cellar or cave. The object in bringing the cheeses into the first ripening or drying room is to get a fairly dry surface, and also to facilitate the development of the fungi which exercise such an important part in the ripening process.

During the time the cheeses are in the drying-room a great deal of attention and observation is necessary on the part of the maker. If the moulds do not grow freely or the cheeses shrink, then the atmosphere is too dry. If, on the other hand, the cheeses get greasy or points of dark green or black appear, then the temperature is either too low or the atmosphere too damp. In the drying-room the sparred shelves should run down the middle and not be placed against the wall, and the cheeses are first placed on the top shelves and gradually lowered as they ripen and new cheeses are brought in.

At the stage when the cheeses are removed to the cellar or ripening-room they should feel soft and springy to the touch. The atmosphere of the cellar should be fairly damp and still, and little ventilation is required. The temperature should be maintained at about 50 degrees Fahr., and the cheeses should be turned daily. The shelves upon which the cheeses rest are covered with wheat straw, which is occasionally changed.

On removing the cheeses to the lower temperature of the cellar, the growth of the moulds is greatly reduced, and largely ceases. The outsides assume a reddish-brown appearance, and the cheeses get a little sticky and glairy on the surface. This is an indication that the cheeses are ripe and

ready for sale, for at this stage certain compounds are formed which give characteristic flavours to this type of cheese. If kept too long they will rapidly deteriorate and liquefy, and become unpalatable.

The cheeses are usually packed in lots of six and wrapped in straw, or they may be placed in the familiar wooden chip boxes and sent to market when about three-fourths ripe.

The mould growth on Camembert cheese is of the greatest importance; and if the colour appears in any different sequence to that described, then the cheeses will be inferior.

At first the cheeses should be covered with a pure white rather pilose mould, forming a layer of about one-eighth of an inch thick over the whole surface of the cheese. With the ripening of the spores of the mould, the colour gradually changes to greyish-blue. This change becomes complete in about three weeks from the time of making, and no further mould-growth seems to take place afterwards. Finally, the mould breaks down and the brown-reddish condition of the surface appears, and at this stage the cheeses are considered ripe. In a well-made cheese, cut through the middle when ripe, the softening of the curd will extend to the centre; whereas a cheese badly made will show a layer of hard sour curd in the centre, while the outside portions will be in an almost liquid state.—"Journal of the Board of Agriculture."

ENSILAGE.

Reports from most of the dairying districts in New South Wales indicate a serious shortage (says the "Dairy Bulletin") of autumn and early spring rains, and, though some relief has come in parts through recent thunderstorms, the falls have been patchy and on the whole insufficient. The indications point to one of these recurring dry spells which are so frequent in our Australian experience.

From a dairyman's point of view this is none too encouraging, but must be accepted since climatic conditions are not under our control. With the knowledge, however, that dry spells are frequent, and apparently inevitable, common sense suggests that provision shold be made to meet them. That dairymen are beginning to learn the lesson there is no doubt, but they might move far more rapidly than they are doing in the direction of conservation both of food and water. Why dairymen do not go in more extensively for ensilage than they do it is difficult to say, for this form of fodder conservation is no longer in the experimental stage. Its value has been proved over and over again. Nor is it beyond the means of the average dairyman, and no great art is required to make good serviceable ensilage. As a change of ration in a good year it is valuable, while in dry times it is indispensable for ensuring the milk flow. No doubt faults can be found with many forms of silos, and there is an unsettled dispute betwen the advocates of the overhead and the pit systems; but the man who waits for a perfect silo to come along before doing anything is destined to suffer serious losses in milk yields and dairy stock. Two years ago Victorian dairymen lost 100,000 head of dairy stock through failure to provide for the drought which then struck them. Last season the south coast of New South Wales also suffered serious losses through the same cause. To allow such a condition of things to continue when it can be remedied is the height of improvidence, and the sooner dairymen face the problem in real earnest the better it will be for them and the industry.

List of Stallions holding a Government Certificate of Soundness on 31st August, 1910,

AND

Synopsis Showing various Defects of Stallions Rejected.

Certificate Number.	Name of Horse.	Age.	Name of Owner.	Address.	Date.	Vet.
	DRAUGHTS.					
305	Balmladie	5 years	H. Bowman	Coolabunia, Kingaroy	27-4-10	H. O'B.
125	Banker (L)	Aged	M. Hinz	Back Plain, Clifton	29-9-09	A. H. C.
430	Banker II.	3 years	J. T. Heenan	Laidley	3-6-10	A. McG.
124	Baronet	4 „	J. Bourke	College Green, Clifton	29-9-09	A. H. C.
403	Baroona Dreadnaught	5 „	T. A. Pickering	Ipswich	27-4-10	A. H. C.
153	Ben Rhu	2 „	W. Devan	Mount Sturt, Warra	15-2-10	A. H. C.
426	Black Dave (L)	Aged	O. Christensen	Childers	26-5-10	A. McG.
139	Blaze (L)	„	W. G. Wood	Yangan, Warwick	14-2-10	A. H. C.
69	Blue Metal (L)	„	J. W. Miles	Wellcamp, Warwick Line	2-8-09	A. H. C.
404	Bonnie Doon	2 years	G. Elliot	Wheatley Farm, Laidley	27-4-10	A. H. C.
134	Briton	4 „	W. A. Deacon	Allora	2-2-10	A. McG.
206	Cedric Prince	3 „	M. L. Macmillan	Lochinvar Ayre, N.Q.	24-5-10	G. T.
151	Champion	5 „	J. Brownlie	Junabee, *via* Warwick	15-2-10	A. H. C.
165	Champion of the North (L)	Aged	J. S. Thousman	Kuljura	18-4-10	A. McG.
467	Clinker	2 years	J. J. Kidner	Thulimba, Stanthorpe	21-7-10	A. H. C.
169 } 401 }	Colonel II.	2 „	W. Liebell	Happy Valley, Oakey	18-4-10	A. H. C.
330	Commonwealth (L)	Aged	R. G. Nicholl	Biggenden	21-7-10	H. O'B.
549	Crystal Blaze	5 years	J. O'Leary	Warwick	3-8-10	A. McG.
130	Crystal	3 „	R. W. Gordon	Allora	1-2-10	A. McG.
501	Croy Hero (L)	Aged	J. Shannon	Salt Bush, Mackay	22-6-10	A. McG.
318	Defiance II. (L)	„	G. Williams	Dundee, Westwood	9-6-10	H. O'B.
511	Dixie	3 years	J. Burnett	Brookfield	20-6-10	A. McG.
308	Dobin	5 „	W. Madden	Springsure	19-5-10	H. O'B.
452	Donald	2 „	J. Robinson	Tillarah, Gatton	19-7-10	A. H. C.

Department of Agriculture and Stock,
Brisbane, 24th October, 1910.

WARNING TO OWNERS OF MARES.

It has been noticed in the Press that Stallions are advertised as holding a Veterinary Certificate of Soundness. As it is known to the Department that *many of these Stallions have been rejected by the Government Veterinary Surgeons*, Owners of Mares are warned to require a Certificate issued by the Department and signed by a Government Veterinary Surgeon.

307	Dragon	3 years	G. Wallis	Springsure	19-5-10	H. O'B.
186	Drummer's Lad	3 "	E. Herbert	Glen Mona, Warra	4-5-10	A. McG.
135	Dundonald II.	2 "	J. Byrne	Gatton	3-2-10	A. H. C.
506	Farewell	4 "	A. C. C. Rocks	Gayndah	5-7-10	A. McG.
536	Garfield	3 "	J. O'Sullivan	Greenmount	2-8-10	A. McG.
172	General Campbell	5 "	Watson Bros.	Pittsworth	18-4-10	A. McG.
429	Glenore (L)	Aged	M. J. McNamara	Forest Hill	2-6-10	A. McG.
504	Goldfinder (L)	"	J. Farrelly	Degilbo	5-7-10	A. McG.
145	Grand Duke of Maryvale	5 years	T. Armstrong	Warwick	14-2-10	A. H. C.
421	Hero II.	5 "	R. Pearson	Englesburg	5-5-10	A. H. C.
439	Hero (L)	Aged	A. N. Gilbert	Boompa	21-6-10	A. H. C.
441	Hero (L)	"	Gant and Brand	Huxley, Isis	21-6-10	A. H. C.
495	John M.P. (L)	"	J. O'Callighan	Brisbane	12-8-10	A. McG.
515	King Dick	5 years	J. Green	Roma	19-7-10	A. McG.
67	King Lion (L)	6 "	J. Caven Lonsdale	Warwick	3-8-09	A. H. C.
313	King Edward VII.	4 "	Department of Agriculture and Stock	Warren State Farm	8-6-10	H. O'B.
537	Kyneton (L)	Aged	A. L. King	Oakey	2-8-10	A. McG.
519	Lade of Kilpride	4 years	J. E. McMullen	Roma	19-7-10	A. McG.
168	Lion Again	2 "	H. Davis	Greenmount East	18-4-10	A. H. C.
163	Lord Lyon (L)	Aged	T. Tennyson	Oak View, Kilkivan	18-4-10	A. McG.
120	Lord Roberts (L)	"	E. M. Waters	Werribee, Victoria	16-8-09	A. McG.
303	Major	3 years	F. J. Howe	Wondai	27-4-10	H. O'B.
423	Master Hero	2 "	W. Stewart	Hazlebrook, Boonah	5-5-10	A. H. C.
539	Master Lion	3 "	J. O'Sullivan	Greenmount	2-8-10	A. McG.
144	Navy	5 "	Wilson Brothers	Silverwood, Warwick	14-2-10	A. H. C.
121	Neville (L)	Aged	E. M. Walters	Werribee, Victoria	19-8-09	A. McG.
533	Night Watch (L)	"	M. Hanlon	Brisbane	21-7-10	A. McG.
424	President	4 years	J. Wilkinson	Anthony, *viâ* Ipswich	5-5-10	A. H. C.
19	Prince of Pinegrove		Gatton College	Gatton	1-7-09	G. T.
128	Prince Rangi	3 "	H. T. Hooper	Ipswich	8-12-09	A. H. C.
176	Robinhood	4 "	J. H. C. Roberts	Croxley, Kingsthorpe	20-4-10	A. H. C.
141	Rockston	4 "	J. Doyle	Warwick	14-2-10	A. H. C.
528	Roy	4 "	J. Peters	Esk	26-7-10	A. McG.
550	Royal Title	2 "	F. Loneragan	Bowenville	3-8-10	A. McG.
155	Royalty	5 "	E. Rowe	Goombungee	23-2-10	A. McG.
461	Royal Pluto	5 "	W. Olm	Ropeley, Gatton	19-7-10	A. H. C.
537	Sandow	5 "	S. H. Rowe	Helidon	2-8-10	A. McG.

LIST OF STALLIONS HOLDING A GOVERNMENT CERTIFICATE OF SOUNDNESS—*continued.*

Certificate Number.	Name of Horse.	Age.	Name of Owner.	Address.	Date.	Vet.
			DRAUGHTS—continued.			
544	Selected	5 years	L. Scott	Pittsworth	2-8-10	A. McG
463	Silver Star	2 ,,	M. J. McNamara	Forest Hill	20-7-10	A. H. C.
146	Sir Leonard	3 ,,	R. Roach	Emu Vale, Warwick	14-2-10	A. H. C.
166	Sir Mariner	2 ,,	R. Walsh	Toowoomba	18-4-10	A. McG.
590	Sir William	3 ,,	W. Hart	Elbow Valley, Warwick	8-8-10	A. H. C.
402	Southgate Carbineer	3 ,,	M. Baker	Grandchester	27-4-10	A. H. C.
532	Springfield Champion	3 ,,	S. Plant	Crow's Nest	26-7-10	A. McG.
414	Success	2 ,,	Hans Jensen	Rosevale, *viâ* Rosewood	5-5-10	A. H. C.
513	Taierie's Pride	5 ,,	F. Hughes	Mount Gravatt	11-7-10	A. H. C.
185	Trojan	4 ,,	E. M. Simpson	Bon Accord, Dalby	4-5-10	A. McG.
160	True Blue (L)	Aged	Col. H. Venn King	Gowrie, Kingsthorpe	23-2-10	A. McG.
518	True Type	3 years	T. B. Cunningham	Roma	19-7-10	A. McG.
302	True Type (L)	Aged	J. Sholcroft	Kingaroy	27-4-10	H. O'B.
521	Wedgewood	3 years	S. A. I. Co.	Roma	19-7-10	A. McG.
142	Young Aster	2 ,,	Craike Brothers	Lord John Swamp	14-2-10	A. H. C.
422	Young Champion (L)	Aged	W. A. C. Wendorf	Boonah	5-5-10	A. H. C.
451	Young Dalery	2 years	O. Anderson	Laidley Creek West	19-7-10	A. H. C.
433	Young Dundonald (L)	Aged	J. Logan	Gatton	16-6-10	A. H. C.
482	Young Earl of Springfield (L)	,,	G. Brown	Rosewood	8-8-10	A. McG.
492	Young Gladfield	4 years	M. Brosnan	Warwick	8-8-10	A. McG.
331	Young Goldfinder	4 ,,	J. Guston	Degilbo	21-7-10	H. O'B.
10	Young Mariner	6 ,,	J. J. Lanihan	Turbot street, Brisbane	5-5-09	A. H. C.
431	Young Master Lion (L)	Aged	Bottomley and Co.	Ipswich	3-6-10	A. McG.
502	Young Monarch (L)	,,	J. Reinke	Gayndah	5-7-10	A. McG.
164	Young Paisley	4 years	D. R. Palmer	Greenmount, Warwick Line	18-4-10	A. McG.
534	Young Rob	4 ,,	C. E. Smoothoff	Westbrook	2-8-10	A. McG.

BLOOD HORSES.

323	Ace of Spades (L)	Aged ...	Wilson and McDowall ...	Calliope Station	9-6-10	H. O'B.
187	Aconite	3 years ...	J. Burghardt	Warra	4-5-10	A. McG.
320	Adrian	3 „ ...	Mr. Willet	Mount Morgan	9-6-10	H. O'B.
3	Antares (L)	Aged ..	J. Allman	Warwick	25-[illegible]-09	A. H. C.
551	Archlight	5 years .	J. Thomas	Toowoomba	3-8-10	A. McG.
543	Ardohn (L)	Aged ...	J. Cananan	Warwick	2-8-10	A. McG.
557	Banquo	5 years ...	A. Colley	Ascot, Brisbane	12-8-10	A. McG.
70	Battle Bridge (L)	Aged ...	J. McGovern	Clifton	4-8-09	A. H. C.
420	Bangalore	2 years ...	H. Nutley	Harrisville	5-5-10	A. H. C.
489	Betterment	3 „	J. C. Musgrave	Ascot, Brisbane	8-8-10	A. McG.
310	Bloodwood	4 „ .	H. C. Taylor ..	Cullin-la-ringo	19-5-10	H. O'B.
329	Bonny (L)	Aged ..	Mr. Lutteral ...	Degilbo	21-7-10	H. O'B.
1[illegible]0	Borger	3 years ...	F. Strofield	Goondiwindi	27-4-10	A. McG.
99	Borghese (L)	Aged ...	E. Weinholt	...	9-8-09	H. O'B.
312	Bower King	3 years ...	Mr. Watkins	Rockhampton	8-6-10	H. O'B.
204	Brian Boru	3 „ .	J. S. Love	Townsville	24-5-10	G. T.
462	Clance	2 „ ...	G. Bloss	Thornton, Laidley	19-7-10	A. H. C.
256	Darganade	3 „ ...	W. Cattenach . .	Crow's Nest...	26-7-10	A. McG.
129	Dean Park (L)	Aged ...	F. H. Kates	Hendon	1-2-10	A. McG.
317	Dermot Asthore	4 years .	C.Q.M.E. Co.	Lake's Creek	9-6-10	H. O'B.
531	Desmond	4 „ ...	S. Littleton	Crow's Nest	26-7-10	A. McG.
474	Diabolo (L)	Aged ..	W. J. Tucker	Brisbane	8-8-10	A. McG.
159	Eh Bandy	4 years ...	J. Lebsauft	Goombungee	23-2-10	A. McG.
28	Emancipist (L)	Aged ..	F. Hughes	Mt. Gravatt, Brisbane	15-7-09	A. H. C.
545	Euroa (L)	„ ...	Shiel Bros. . .	Toowoomba	2-8-10	A. McG.
157	Eyclipes	3 years ..	J. C. Ruff	Goombungee	23-2-10	A. McG.
547	Fashion	3 „	J. McLennan	Nobby	3-8-10	A. McG.
440	Fate	5 „ ...	H. H. Rickert	Burnett Heads, Bundaberg ...	21-6-10	A. H. C.
507	Fitz Archie (L)	Aged ...	J. M. A. Redmond ...	Forest Hill	5-7-10	A. McG.
207	Florin	5 years ...	F. Cadio	Ravenswood	24-5-10	G. T.
309	Galtimore	5 „ ...	Mr. Burke	Springsure	19-5-10	H. O'B.
319	Garches (L)	Aged .	S.A. Ld. Mortgage Co. ..	Rockhampton	9-6-10	H. O'B.
179	Gigul	3 years ..	W. Hensler	Goondiwindi	27-4-10	A. McG.
413	Glen Roi	4 „ ..	J. Goan	Coulson, Boonah	5-5-10	A. H. C.
24	Grit (L)	Aged ..	Story and Ramsay ...	Brisbane	13-7-09	A. H. C.
417	Hector	4 years ..	J Harding	Mugura, *viâ* Engelsburg	5-5-10	A. H. C.

LIST OF STALLIONS HOLDING A GOVERNMENT CERTIFICATE OF SOUNDNESS—*continued.*

BLOOD HORSES—continued.

Certificate Number.	Name of Horse.	Age.	Name of Owner.	Address.	Date.	Vet.
117	Hector II. (L)	Aged	John Free	Brisbane	5-8-09	A. H. C.
410	Honesty (L)	"	J. P. Surawski	Templin, *viâ* Boonah	5-5-10	A. H. C.
435	King Hal	5 years	G. Mant	Gigoomgan Station	21-6-10	A. H. C.
416	Lemco (L)	Aged	W. A C. Wendorf	Boonah	5-5-10	A. H. C.
522	Lord Dalmeny	4 years	J. A. Winton	Roma	19-7-10	A. McG.
459	Lord Nelson	4 "	A. J. Wagner	Gatton	19-7-10	A. H. C.
171	Lurcher (L)	Aged	W. G. Grant	Toowoomba	18-4-10	A. McG.
473	Mackamoor	5 years	J. J. Moore	Barambah	1-8-10	A. H. C.
96	Marathon (L)	Aged	F. W. Drew	Chermside, N.C.L.	9-8-09	A. H. C.
468	Mataba	4 years	Storey and Ramsay	Brisbane	29-7-10	A. McG.
453	Moralizer	2 "	W. J. Bowden	Forest Hill	17-7-10	A. H C.
548	Moravian (L)	Aged	Gore and Co.	Yandilla	3-8-10	A. McG.
524	McIlwraith	4 years	T. A Clapperton	Tarong, Nanango	22-7-10	A. McG.
415	Nemo	5 "	J. Everdale	Beaudesert	5-5-10	A. H. C.
100	Our Boy (L)	Aged	Austin Bros.	Dugandan	9-8-09	H. O'B.
434	Patriot (L)	"	J. Cogan	Coleman's Siding, Kingaroy Line	21-6-10	A. H. C.
108	Pluto (L)	"	Moore Bros.	Kenilworth	9-8-09	A. McG.
559	Rapidity (L)	"	J. Hardgraves	Coomera	27-8-10	A. McG.
475	Raven (L)	"	A. F. N. Furz	Point Pine, Gatton	8-8-10	A. McG.
508	Rhuenzori	3 years	B. Micklethwait	Gayndah	5-7-10	A. McG.
466	Rifle Boy	4 "	G. A. Tryhorn	Ma Ma Creek, Grantham	21-7-10	A. H. C.
328	Ruination (L)	Aged	J. A. Bates	Boompa	21-7-10	H. O'B.
554	Sandlewood	2 years	J. E. Stewart	Brisbane	1-8-10	A. McG.
454	Silmond	4 "	G. Quinn	East Haldon	19-7-10	A. H. C.
311	Sinner (L)	Aged	J. Westoby	Springsure	19-5-10	H. O'B.
503	Sir Tab	5 years	J. Fromholtz	Eidsvold	5-7-10	A. McG.
315	Skopos (L)	Aged	Messrs. Horn Bros.	Gladstone	8-6-10	H. O'B.
147	St. Elmo	2 years	F. Johnstone	Mountain Peak, Dalveen	15-2-10	A. H. C.
62	Tabanddy (L)	Aged	J. Letsauft	Goombungee	2-8-09	A. H. C.
455	Tambo	5 years	W. G. Hahn	Ropeley, Gatton	19-7-10	A. H. C.

188	The Lad	4 years	Wentworth Bros.	Bon Accord, Dalby	4-5-10	A. McG.
427	The Member	Aged	C. King	Childers	26-5-10	A. McG.
94	Valiant	"	E. T. Bell	Coochin	9-9-09	A. H. C.
181	Valutine	2 years	J. Riddell	Goondiwindi	27-4-10	A. McG.

LIGHT HORSES.

152	Arab Boy II.	3 years	C. W. Moran	Texas	15-2-10	A. H. C.
140	Antrim's Lad (L)	Aged	T. Burgess	Post Office, Warwick	14-2-10	A. H. C.
156	Berlin King	4 years	E. Rowe	Goombungee	23-2-10	A. McG.
324	Better Time (L)	Aged	R. Duncan	Ayrshire Park	9-6-10	H. O'B.
409	Busy Boy	2 years	A. Jackson	Brisbane street, Ipswich	27-4-10	A. H. C
78	Count Harold (L)	6 "	B. Sinnamon	Oxley	6-8-09	A. H. C
428	Dalaven Wilkes	5 "	H. McGuigan	Childers	26-5-10	A. McG.
488	Despatch	5 "	S. Watson and Sons	Ipswich	8-8-10	A. H. C.
444	De Wet	5 "	A. Heath	Granville P.O., Maryborough	22-6-10	A. H. C.
1	Duke of Vermont (L)	Aged	W. C. Thurlow	Red Hill, Brisbane	5-1-09	G. T.
136	El Lark (L)	"	A. W. Free	Hermitage, Warwick	14-2-10	A. H. C.
412	Fitz Harold	2 years	E. Hopf	Roadvale	5-5-10	A. H. C.
485	Flintlock	3 "	Captain Phillip Charlie	Richmond, N.S W.	8-8-10	A. H. C.
484	Flyaway	3 "	Captain Phillip Charlie	" "	8-8-10	A. H. C.
321	Gester (L)	Aged	J. J. McCory	Mount Morgan	9-6-10	H. O'B.
448	Glen Harold	3 years	E. Stanton	Tingalpa	1-7-10	A. H. C.
322	Glenrowan (L)	Aged	Mr. Cooper	Westwood	9-6-10	H. O'B.
450	Globe Echo (L)	"	C. R. Pickworth	250 Queen street, Brisbane	4-7-10	A. H. C.
34	Globe Second (L)	"	J. C. Mullampy	Forbes, N.S.W.	19-7-09	A. H. C.
23	Goldspur (L)	"	W. Macfarlane	Nth. Ipswich	12-7-09	A. H. C.
432	Governor	5 years	J. Coonan	Samford	8-6-10	A. McG.
443	Harold II. (L)	Aged	Moore Bros.	Bundaberg	22-6-10	A. H. C.
314	Harold Minister (L)	"	A. Kroning	Rockhampton	8-6-10	H. O'B.
38	Harold's Son (L)	"	W. J. Hill	Kelvin Grove, Brisbane	28-7-09	A. H. C.
175	Kentucky Chief	2 years	S. R. Donelly	Glenbrook, Oakey	18-4-10	A. H. C.
138	King Edward	3 "	Mrs. M. Higgins	Leslie, *viâ* Warwick	14-2-10	A. H. C.
203	King Edward (L)	Aged	E. Fryar	Hermit Park, Townsville	23-5-10	G. T.
205	King Harold (L)	"	E. Cronin	Townsville	23-5-10	G. T.
472	King Harold	3 years	W. Young	Brisbane	29-7-10	A. McG.
483	King Globe	3 "	R. Storey	"	8-8-10	A. H. C.

LIST OF STALLIONS HOLDING A GOVERNMENT CERTIFICATE OF SOUNDNESS—*continued.*

LIGHT HORSES—continued.

Certificate Number.	Name of Horse.	Age.	Name of Owner	Address.	Date.	Vet.
137	King's Ribbon	2 years	C. W. Bishop	Mill Hill, Warwick	14-2-10	A. H. C.
76	Knight Harold (L)	Aged	J. S Sinnamon	Moggill, Indooroopilly	6-8-09	A. H. C.
558	Lord Antrim (L)	,,	J. Stanfield	Christmas Creek, Beaudesert	15-8-10	A. McG.
486	Lucky Boy	3 years	R. Cocks	Toowong	8-8-10	A. H. C.
32	Major Hall (L)	Aged	H. Cribb	Ipswich	19-7-09	A. H. C.
491	Master Robin (L)	,,	P. Belz	Oxley	8-8-10	A. McG.
541	Mel Harold (L)	,,	C. W. Mellor	Toowoomba	2-8-10	A. McG.
174	Merry Boy	3 years	D. McNamara	Telford Street, Toowoomba	18-4-10	A. H. C.
546	M.P.	4 ,,	H. Ashley	Toowoomba	2-8-10	A. McG.
161	Obligado	5 ,,	W. J. Hill	Kelvin Grove, Brisbane	31-3-10	A. McG.
5	Pato Alto (L)	Aged	F. C. Beeson	Warwick	25-2-09	A. H. C.
552	Perfection (L)	,,	J. Higgins	Toowoomba	3-8-10	A. McG.
527	Perfection's Pride	4 years	D. Lock	,,	26-7-10	A. McG.
464	Playful (L)	Aged	P. Scully	Blenheim, Laidley	20-7-10	A. H. C.
555	Plenipotentiary	5 years	J. H. McConnell	Cressbrook	29-7-10	A. McG.
150	Postal Vote	3 ,,	J. A. McIntosh	Mountside, *viâ* Warwick	15-2-10	A. H. C.
327	Prince Harold Jnr. (L)	Aged	Mr. Marwedel	Rockhampton	10-6 10	H. O'B.
457	Rob	2 years	E. E Lowe	Gatton	19-7-10	A. H. C.
149	Rothchild (L)	Aged	R. Shepherd	Upper Freestone, Warwick	15-2-10	A. H. C.
405	Secret King	5 years	W. H. Hinchcliff	Waterworks, Ipswich	27-4-10	A. H.C.
127	Shandy (L)	Aged	W. Carr	Brisbane	1-2-10	A. H.C.
316	Sheik	4 years	M. Gill	Mount Morgan	9-6-10	H. O'B.
512	Sinoda (L)	Aged	F. Hughes	Mount Gravatt	11-7-10	A. McG.
479	Sir Charles Beldon	4 years	J. Boughan	Rosewood	8-8-10	A. McG.
476	Squire Harold	3 ,,	W. Wallon	Mooretown	8 8 10	A. McG.
105	Star Harold (L)	Aged	E. F. Pickering	Sydney	7-8-09	H. O. B.
456	St. Elmo	2 years	W. D. Thatcher	Hope Vale, Laidley Creek	19-7-10	A. H. C.
173	Tartan	3 ,,	S. R. Donelly	Glenbrook, Oakey	18-4-10	A. H. C.
325	Taniwah (L)	Aged	H. Ralston	Kinboombi	9-6-10	H. O'B.
438	Universe	2 years	W. J. Weston	Maryborough	21-6-10	A. H. C.

148	Via Recta	3 years	F. C. Beeson	Sandy Creek, Warwick	15-2-10	A. H. C.
538	Wallace (L)	Aged	H. J. Ryan	Purga Creek	2-8-10	A. McG.
445	Young Logan (L)	"	F. Hastings	March street, Maryborough	22-6-10	A. H. C.
514	Young Monarch (L)	"	M. Coonan	Samford	15-7-10	A. McG.
447	Young Pholoski	5 years	E. G. Tucker	Coorparoo	27-6-10	A. McG.
494	Young Prince Clarence (L)	Aged	R. Morrison	Samford	12-8-10	A. McG.

PONIES.

133	Admiral Togo (L)	Aged	J. C. Gillam	Clifton	1-2-10	A. McG.
332	Ajax (L)	"	G. A. Stevenson	Degilbo	21-7-10	H. O'B.
184	Apollo (L)	"	G. S. Keen	Dalgelly	27-4-10	A. McG.
449	Bernie	5 years	G. Wilson	Hill End, South Brisbane	26-7-10	A. H. C.
202	Bobs	2 "	J. J. Fanning	Townsville	23-5-10	G. T.
446	Bonnie Boy	3 "	E. Doctor	Brisbane	27-6-10	A. McG.
460	Bowman	2 "	E. O'Connor	Gatton	19-7-10	A. H. C.
418	Byron II.	2 "	E. Appleton	Dugandan	5-5-10	A. H. C.
131	Cock Robin (L)	Aged	F. Grimes	Clifton	1-2-10	A. McG.
177	Comet	4 years	J. H. C. Roberts	Croxley, Kingsthorpe	20-4-10	A. H. C.
477	Commodore	5 "	W. Seymore	Ipswich	8-8-10	A. McG.
542	Czar	3 "	J. E. Young	Wellcamp	2-8-10	A. McG.
42	Dodger (L)	Aged	G. Holmes	Kelvin Grove, Brisbane	22-7-09	A. H. C.
334	Don	3 years	F. Young	Degilbo	21-7-10	H. O'B.
523	Douquet (L)	Aged	N. A. Bissett	Roma	19-7-10	A. McG.
326	Eclipse (L)	"	H. Ralston	Kinboombi Station	9-6-10	H. O'B.
516	Eclipse (L)	"	D. J. Baker	Roma	19-7-10	A. McG.
520	Eclipse (L)	"	H. Waldon	"	19-7-10	A. McG.
132	Exchange	4 years	W. Sismen	Clifton	1-2-10	A. McG.
143	Explorer	5 "	Burgess Bros.	Canning Downs, Warwick	11-2-10	A. H. C.
304	Frisco (L)	Aged	W. H. Pointon	Kingaroy	27-4-10	H. O'B.
406	Glen Roy II.	5 years	A. M. Rea	Walloon	27-4-10	A. H. C.
183	Gold Dust (L)	Aged	W. Ferguson	Newstead, Boggabilla	27-4-10	A. McG.
12	Hector (L)	"	T. W. Cahill	Eagle Farm, Brisbane	19-5-09	A. H. C.
2	Ich Dien (L)	4 years	J. Mahon	Gatton College, Gatton	28-1-09	G. T.
46	Katefelto (L)	6 "	H. S. Bere	Southport	24-7-09	A. H. C.
301	Kelso	2 "	A. Pickles	Kingaroy	27-4-10	H. O. B.
487	Kelso (L)	Aged	S. Watson and Sons	Ipswich	8-8-10	A. H. C.
408	Kim (L)	"	A. Heise	Minden, *viâ* Rosewood	27-4-10	A. H. C.

LIST OF STALLIONS HOLDING A GOVERNMENT CERTIFICATE OF SOUNDNESS—*continued.*

PONIES—continued.

Certificate Number.	Name of Horse.	Age.	Name of Owner.	Address	Date.	Vet.
458	King (L)	Aged	A. J. Wagner	Gatton	19-7-10	A. H. C.
480	King Edward	3 years	P. Randle	Brisbane	8-8-10	A. McG.
419	King Toni	5 „	A. Kübler	Mugura, *viâ* Engelsburg	5-5-10	A. H. C.
529	Laddie	3 „	T. Kite	Blackbird	26-7-10	A. McG.
530	Larry	4 „	W. Askin	Crow's Nest	26-7-10	A. McG.
103	Little Man (L)	Aged	Mrs. Fry	Bajool	11-6-09	H. O'B
86	Little Model (L)	„	H. Spün	Rosevale	7-8-09	A. McG.
407	Little Wonder (L)	„	D. Barlow	Club Hotel, Ipswich	27-4-10	A. H. C.
65	Llew-Llwyd (L)	„	W. Stephens	Brisbane	3-8-09	A. H. C.
97	Little Thom (L)	...	H. J. Pocock	Ipswich	9-8-09	A. McG.
167	Lord Roberts (L)	Aged	S. Lovett	Toowoomba	18-4-10	A. McG.
442	McFadyn (L)	„	F. C. Jones	Gympie	22-6-10	A. H. C.
154	McShane's Choice	3 years	Hiram Philp	Herries street, Toowoomba	15-2-10	A. H. C.
481	Master (L)	Aged	T. T. Barry	Brisbane	8-8-10	A. McG.
478	Model	2 years	W. Orr	Graceville	8-8-10	A. McG.
116	Napper (L)	Aged	F. Hughes	Mount Gravatt, Brisbane	15-7-09	A. H. C.
170	Nipper	4 years	J. H. Snell	Toowoomba	18-4-10	A. McG.
436	Oliver II. (L)	Aged	R. Geal	Wooroolin, Kingaroy Line	21-6-10	A. H. C.
64	Opal King (L)	„	M. J. Kelly	Toowoomba	2-8-09	A. H. C.
158	Paddy Whack (L)	„	W. H. Lücht	Doctors Creek, Toowoomba	23-2-10	A. McG.
111	Phidolphus (L)	6 years	F. J. Higgins	Brisbane	9-8-09	H. O'B.
425	Prince Edward (L)	Aged	J. Delany	Childers	26-5-10	A. McG.

437	Resolution	3 years	A. B. McDonald	Gympie	22-6-10	A. H. C.
510	Rocket	4 ,,	F. L. Sweet	Gayndah	5-7-10	A. McG.
540	Rufus	5 ,,	A. J Luke	Toowoomba	2 8-10	A. McG.
201	Sam (L)	Aged	D. Edwards	Townsville	23-5-10	G. T.
525	Silver Boy	3 years	E. Doctor	Brisbane	23-7-10	A. McG.
509	Solophone	3 ,,	P. Meyery	Gayndah	5-7-10	A. McG.
493	Steele Rudd (L)	Aged	Beetham and Launder	Beaudesert	8-8-10	A. McG.
556	Sunrise	4 years	Dr. R. A. Meek	South Brisbane	5-8-10	A. H. C.
182	Sydney Dandy (L)	Aged	Treweeke Bros.	Umbercoolie	27-4-10	A. McG.
37	The Wonder (L)	,,	A C. Lewis	Brisbane	22-7-09	A. H. C.
465	Togo	5 years	S. H. Rowe	Lockyer Siding, Helidon	20-7-10	A. H. C.
333	Tommy Atkins (L)	Aged	A. Robinson	Biggenden	21-7-10	H. O'B.
517	Tommy Dodd	5 years	C. W. Schefe	Roma	19-7-10	A. McG.
306	Victor	3 ,,	W. E. Wickhorst	Kingaroy	27-4-10	H. O'B.
189	Wee McGregor	3 ,,	W. B. Black	Brigalow	4-5-10	A. McG.
411	Young Byron	2 ,,	J. Alexander	Boonah	5-5-10	A. H. C.
469	Young Excell	2 ,,	Rice and Foley	Brisbane	29-7-10	A. McG.
470	Young Goldmine	5 ,,	Rice and Foley	,,	29-7-10	A. McG.

Table Showing Various Defects of Stallions Rejected.

Defects.	Draughts.		Blood.		Light.		Ponies.		Totals.	
	Number Examined.	Number Certificated.	Number Examined.	Number Certificated.	Number Examined.	Number Certificated.	Number Examined	Number Certificated	Number Examined.	Number Certificated.
	135	82	89	58	69	57	63	57	356	254
	Number Rejected.	Percentage Rejected.	Number Rejected.	Percentage Rejected.	Number Rejected.	Percentage Rejected.	Number Rejected.	Percentage Rejected.	Number Rejected.	Percentage Rejected.
	53	39·259	31	34·831	12	17·391	6	9·523	102	28·651
Sidebones	37	27·407	1	1·123	...	...	...	...	38	10·674
Ringbones	4	2·962	2	2 247	2	2·898	...	...	8	2·247
Spavin (bones)	3	2·2	14	15·730	6	8 695	3	4·761	26	7·303
Curbs	2	1·481	10	11·235	2	2·898	...	...	14	3·932
Bad Conformation	1	·740	..	...	...	...	2	3·174	3	·842
Whistler or Roarer	4	2·962	3	3·369	...	. .	...	...	7	1·966
Cataract	...	...	...	...	1	1·449	...	...	1	·280
Shivering	...	...	...	...	1	1·449	...	...	1	·280
Unsound Feet	2	1·481	1	1·123	...	...	1	1·587	4	1·123
Total Unsoundness ...	53	39·259	31	34·831	12	17·391	6	9·523	102	28·651

HORSE SHOW ON A LINER.

The trip of the Atlantic Transport Line steamship "Minnewaska," from London, which ended in New York on 1st August, was enlivened by a horse show, the first of its kind ever held upon the sea. The show was the event of the voyage, for the vessel was carrying a consignment of very fine horses. An entry fee was charged, and this was divided into prizes.

There were 226 horses on the "Minnewaska," including Percherons and Shires. The owners of nearly every one of the animals were passengers, and the idea of holding a horse show came about when these men got together to talk horse. The idea took hold at once, and the men instructed their horsemen to get their entries ready for the ring. The affair was held between decks. A ring was made by clearing a space near the stalls. Only a short run could be made to exhibit the gait of the entires, and the judging was almost altogether on points.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

Stations.	1909.				1910.								
	Sept.	Oct.	Nov	Dec	Jan.	Feb.	Mar	April.	May	June.	July	Aug.	Sept.
North.													
Bowen	0 21	0·36	3 15	19 98	15 45	7 10	21 45	5·26	0 18	2 23	0 58	0 18	3·75
Cairns	0 7	3 19	7·31	15 24	21 80	17 12	24·16	16 13	3 51	6 59	Nil	3 59	1·34
Geraldton	0·36	6 71	14·57	19 98	20 35	34·57	33 74	24 57	11 90	19 36	1 34	7·42	11·51
Gindie State Farm ..										2 65	1·45	Nil	...
Herberton	0·50	2 30	4 50	5 11	16 64	12 21	12 40	3·50	1 85	1·70	Nil	0 88	0·58
Hughenden .	0 8	1 95	0 54	8 01	4 52	3 59	2 95	0 30	0·41	0·85	0·48	Nil	2·75
Kamerunga State Nurs										Nil		3 39	...
Mackay	0 73	2·88	3·18	25 56	35·28	9 73	24 31	6 18	3 73	5 70	1·1	0·18	4·32
Mosseman											..	1 91	2·90
Rockhampton	1·20	2·16	4 55	2·74	11·93	1·28	19 84	0 61	0 59	5 98	1·67	0·23	1·62
Townsville	0·12	2·07	1·31	11 51	23 07	10 88	17 21	2 29	0·26	1 05	0·33	0 3	3·34
South.													
Biggenden State Farm	0·29	..	2 83	6·98	7·22	3 99	3·82	0·73	1·06	5·25	0 92	0·28	.
Brisbane	2 74	1·56	4·14	6 45	7 24	4 19	6 42	1·22	0·43	6 74	0 39	..	2·72
Bundaberg	0·98	0 42	3·55	2 99	11·81	2·43	8·92	0 31	0·19	6 17	2 10	0·16	2·33
Dalby	0·47	1·92	2·13	2·45	10 88	1·33	3 87	Nil	Nil	6 06	1·42	0·64	2·11
Esk	2 60	2 61	2 69	9·20	8 60	1·94	6 09	1 19	0 27	4·74	0 58	0·23	4·65
Gatton Agric. College	2·29	1 87		3 92	11 79		3 66	0 69	0·61	5 05	1·99	0·60	..
Gympie	1 70	2 30	3 82	16 54	5·92	3·48	7 74	1·13	0 22	5·57	0·83	0 32	1·54
Ipswich	3·55	1·93	1·56	4·72	6 91	2 78	3 56	1·65	0 20	3·74	1·67	0·58	1·55
Maryborough	1·56	0·51	3.94	6 83	5·65	2·99	3·92	1 72	0·64	4 89	1·09	0·35	1·22
Roma	0 12	0 90	2·12	1·05	4·74	1·47	8 36	0 15	0 4	5·71	1·24	Nil	0·46
Roma State Farm ...	...	..	.		.	.	.	..	.	.	.	.	0·38
Tewantin ...	1·38	3 82	1·90	8 85	5·96	3·42	15·18	6·30	1·31	15·08	0·76	1·34	1·52
Warren State Farm ..	..	..	.		.	...			..	1·88	..	...	...
Warwick	1·77	2 85	2·77	4·25	3·93	3·14	2·57	0·68	0 55	3·16	1·82	0·54	1·39
" Hermitage State Farm	...	.	...	..	...	...	...	...	.	...	1·73	0 39	...
Westbrook State Farm	...	...	...	..	...	...	..	..	.	2·77	.	...	..
Yandina	3·84	2·30	0·76	20·18	8·71	2·07	11·81	3 26	0·40	13·13	0 70	0·15	0 88

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

From a private source we learn that the rainfall at Tera for the month of October was 3·75 inches.

GEORGE G. BOND,
Divisional Officer.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order RANUNCULACEÆ.

RANUNCULUS, Linn.

R. arvensis, *Linn.* An erect branching, nearly glabrous, annual of a pale green, 6 to 18 in. high. Leaves deeply cut into narrow segments. Flowers small, of a pale yellow. Carpels few, rather large, much flattened, covered on both sides with conical, straight or hooked prickles.

Hab.: A common weed in Europe, on neglected farms. Found near Brisbane, on or near rubbish heaps.

Order CRUCIFERÆ.

TRIBE LEPIDINEÆ.

SENEBIERA, Poer.

S. integrifolia, var. scaber, *Bail.* Stems scabrous throughout. Plants of the normal form are said to be glabrous. I find no other distinction.

Hab.: Masthead Island, *J. A. Leach.* (Aus. Ornith. Union, Oct., 1910, Excur.)

Order CARYOPHYLLEÆ.

TRIBE ALSINEÆ.

SAGINA, Linn.

Sepals 4 or 5. Petals as many, entire or scarcely notched or none. Stamens 8, 10, or fewer. Styles as many as sepals, and alternate with them. Capsule opening to the base into as many valves as styles, alternating with the sepals. Small matted or tufted heads, with subulate leaves and small. Flowers usually borne on long pedicels.

A small genus of the temperate or cooler regions of both the Northern and Southern Hemisphere.

S. procumbens, *Linn.* A minute annual or rarely perennial, 1 to 2 in. or rarely 3 in. high, usually branching from the base and decumbent, forming little spreading tufts, glabrous or very minutely pubescent. Leaves smooth and subulate, joined by a short scarious sheath, the radical ones longer and tufted. Flowers very small, on capillary peduncles longer than the leaves. Sepals 4, about 1 line long. Petals much shorter, often wanting. Valves of the capsules as long as the sepals or rather longer. All these parts usually in fours, but occasionally met with in fives. *S. apetala*, Linn. (Benth, Fl. Austr., I., 160).

Hab.: Met with in the Southern States, but not previously in Queensland. Toowoomba, *H. A. Longman.*

Order URTICACEÆ.

FICUS, Linn.

F. Simmondsii, *Bail., sp. nov.* (Plate No. XVII.) A large tree, the branchlets shortly velvety or puberulous and somewhat angular. Leaves lanceolate, glabrous, 3½ to 5 in. long, 1½ to 2 in. broad, coriaceous, deep-green, somewhat paler on the underside, the lateral nerves and intermediates parallel ones rather numerous, almost 3-nerved at the base, the outer pair looping with the others and forming intramarginal ones. Petioles about 1½ inches long,

Plate XIV

FIG. 1.—SIMMONDSII *Lect.*

very light-coloured, puberulous. Bud scales or terminal stipules about 2 in. long, tapering to sharp points, velvety with brown hairs. Receptacles axilliary, in pairs or solitary, more or less compressed, nearly globose, about 1 in. diameter of a yellowish green turning to a reddish purple, dotted with small and large deep-green dots, and minutely red-speckled near the base. Peduncles stout, puberulous, somewhat 3-angular, 4 to 5 lines long, expanding into a cupule under the receptacle.

Hab. : Coolangatta, *J. H. Simmonds*. In same packet were specimens of that rare species *Ficus Parkinsoni*, Hiern.

Order FUNGI.

The fungus collected by Mr A. J. Boyd, in British New Guinea, and noticed in "Queensland Agricultural Journal," XXIV., 60, under the name of *Lentinus velutinus*, Fries., as received from Mr. Geo. Massee, this eminent Mycologist has lately published as a new species in Kew Bulletin, No 7 (1910) 219, giving the following name and diagnosis:—

Lentinus egregius, *Mass.* Pileus deeply infundibuliform, 4 to 6 in. broad, sub-membraneous, rigid, brownish, scaly, margins erect entire, ciliate. Gills very narrow, hard and whitish edges quite entire. Stems erect, sub-terete, expanding upwards, velvety, of a brownish cinnamon colour, 2½ to 4 in. high, 6 to 9 lines diam ; spores hyaline, oblique ovoid, 6 by 4 μ.

Mr. Massee speaks of this species as one of the largest and most beautiful of the genus.

Hab. . British New Guinea, *A. J. Boyd*

Times of Sunrise and Sunset at Brisbane, 1910.

Date.	September		October		November		December	
	Rises	Sets	Rises	Sets	Rises	Sets	Rises	Sets.
1	6·3	5·33	5·29	5·47	4·58	6·5	4·46	6·28
2	6·2	5·34	5·28	5·48	4·58	6·6	4·46	6·28
3	6·1	5·34	5·27	5·48	4·57	6·7	4·40	6·29
4	6·0	5·35	5·26	5·49	4·56	6·7	4·46	6·30
5	5·59	5·35	5·25	5·49	4·56	6·8	4·46	6·31
6	5·58	5·36	5·24	5·50	4·55	6·9	4·46	6·31
7	5·57	5·36	5·23	5·50	4·54	6·9	4·46	6·32
8	5·56	5·37	5·21	5·50	4·54	6·10	4·46	6·33
9	5·54	5·37	5·20	5·51	4·53	6·11	4·46	6·33
10	5·53	5·37	5·19	5·52	4·52	6·11	4·47	6·34
11	5·52	5·38	5·18	5·52	4·52	6·12	4·47	6·35
12	5·51	5·38	5·17	5·53	4·51	6·13	4·47	6·36
13	5·50	5·39	5·16	5·53	4·51	6·14	4·17	6·36
14	5·49	5·39	5·15	5·54	4·50	6·14	4·48	6·37
15	5·48	5·40	5·14	5·54	4·50	6·15	4·48	6·37
16	5·46	5·40	5·13	5·55	4·49	6·16	4·48	6·38
17	5·45	5·41	5·12	5·56	4·49	6·17	4·48	6·39
18	5·44	5·42	5·11	5·56	4·49	6·18	4·49	6·39
19	5·43	5·42	5·10	5·57	4·48	6·18	4·19	6·40
20	5·42	5·12	5·9	5·57	4·48	6·19	4·50	6·40
21	5·41	5·42	5·8	5·58	4·47	6·20	4·50	6·41
22	5·40	5·43	5·7	5·58	4·47	6·21	4·51	6·42
23	5·38	5·43	5·6	5·59	4·17	6·22	4·51	6·42
24	5·37	5·44	5·5	6·0	4·47	6·22	4·52	6·43
25	5·36	5·44	5·4	6·0	4·47	6·23	4·52	6·43
26	5·35	5·45	5·4	6·1	4·46	6·24	4·53	6·43
27	5·34	5·45	5·3	6·2	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·25	4·51	6·44
29	5·32	5·46	5·1	6·3	4·46	6·26	4·54	6·44
30	5·30	5·47	5·0	6·4	4·46	6·27	4·55	6·45
31	...	...	4·59	6·5	...	...	4·56	6·45

PHASES OF THE MOON.

			H. M.
4 Sept.	●	New Moon	4 6 a.m.
12 „	☾	First Quarter	6 11 „
19 „	○	Full Moon	2 52 p.m.
26 „	☽	Last Quarter	6 54 a.m.
3 Oct.	●	New Moon	6 32 p.m.
11 „	☾	First Quarter	11 40 „
19 „	○	Full Moon	0 24 a.m.
25 „	☽	Last Quarter	3 48 p.m.
2 Nov.	●	New Moon	11 56 a.m.
10 „	☾	First Quarter	3 29 p.m.
17 „	○	Full Moon	10 25 a.m.
24 „	☽	Last Quarter	4 13 „
2 Dec.	●	New Moon	7 11 a.m.
10 „	☾	First Quarter	5 5 „
16 „	○	Full Moon	9 5 p.m.
23 „	☽	Last Quarter	8 36 „

The Orchard.

THE PINEAPPLE CANNING INDUSTRY.

A considerable business is done in Queensland in the way of preserving pineapples, and the excellence of the product turned out by the factories is evidenced by the great demand for it, especially in the Southern States of the Commonwealth. The Queensland factories, although they command the trade of all the States, including New Zealand, must, however, eventually be confronted with the necessity of finding oversea markets, as it is a regrettable fact that, as with many other commodities, as soon as a surplus over Australian requirements is attained, exporters are brought face to face with competition with the cheap labour of the East. For this reason it does not appear probable that this industry will reach very great proportions, considering that there are large pineapple plantations and extensive canning factories engaged in the work in Ceylon, Singapore, Porto Rico, and other tropical countries, where cheap coloured labour, either native or imported, is employed. Last year the quantity of fruit (pineapple) put up by Queensland factories was 2,179,602 lb., which was a decrease of 481,633 lb. on the output for 1908. The area under pineapple cultivation in this State has also slightly decreased during 1909, there being 2,161 acres bearing as against 2,171 acres in 1908. The Consular Agent at San Juan, Porto Rico, West Indies—in his report on the trade of the island—says that pineapple culture in that island affords large and quick returns to investors. It has been stated that the net profit from an acre of the "Cabezona" variety, which yields a very large fruit suitable for shipping purposes, and hence far superior to the "Smooth Cayenne," is not less than £320. The area under pineapples is at present over 2,000 acres, and is increasing so rapidly that it is expected to soon exceed 10,000 acres. Thus far, the shipping of green fruit to the United States has been so profitable that the canneries have not been essential, but more and more fruit is being disposed of in this way.

The "Philippine Agricultural Review" published, in August last, the following figures, given by Mr. Turner, showing the expenses and returns per acre of pineapples in the Laguna district, near San Juan, which show about the average in the different pineapple districts:—

"*Expenses.*—One acre of land, £25; clearing and preparing, £6; 10,000 suckers, £8; planting same, £3; cultivation to crop, £6; fertiliser, 1 ton, £9; picking, packing, &c., 300 crates, £4 16s. 8d.; paper, crates, nails, &c., £12; transport to steamer, £6; freight to New York, £18 12s. 6d.—total, £98 8s. 4d.

"*Returns.*—300 crates at 6s. 8d., £96; 18,000 suckers at 12s. 6d., £6; value of plants in ground, £9; value of acre of land, £30; total, £145 16s. 8d.; leaving a credit balance of £47 8s. 4d."

Of course the Cabezonas are limited in production, and the above figures appear to be based on the cultivation of the smaller and consequently less expensive fruit, which, as it has a wider sale in the markets, is more generally raised.

From the foregoing it would appear that, notwithstanding the high wages paid by Queensland pineapple-growers, the net returns from our plantations will compare more than favourably with those of the Porto Rico planters.

The £320 per acre net profit abovementioned can only refer to plantations of Cabezonas, which sell in New York at 50 cents each (2s. 1d.)

Tropical Industries.

SPLENDID CANE YIELDS.

The "Bundaberg Mail" has an article giving some particulars of the very fine yields of cane which have been an encouraging feature of the present season's harvest in the vicinity of South Kolan. Not only, we are told, are the various properties of Messrs. Gibson and Howes in this happy position, but nearly the whole of the canegrowers have crops of which they have good reason to be proud. This has induced many growers to prepare fresh land for cane, and the total area will be considerably increased.

D1135 variety (originally introduced by Messrs. Gibson and Howes) is said to be superseding almost every other variety as the best all-round cane, resisting frosts and dry weather, and giving satisfactory yields from both the grower's and the manufacturer's points of view. Some farmers, however, prefer Rappoe, especially on new ground. Striped Singapore finds favour with many growers, but experience has proved that Battoe is a bad ratooner, and is not a good stand-over cane.

A number of examples of the heavy yields being obtained this season are given in the article quoted. It appears that Messrs. Gibson and Howes have cut out some very fine blocks, the best, probably, being 7 acres of 22 months' stand-over cane, which averaged 67 tons to the acre of good millable cane. Mr. John Clark has cut a good deal of his 70 acres, some of which gave as high as 35 tons, whilst the average for the whole will be about 25 tons. Mr. C. Tench's well-kept farm is yielding 20 tons per acre for ratoons and plant cane and 30 tons for stand-over.

Mr. E. Plath, whose farm is between the Mount Perry road and the Bingera Railway Station, has a 48-acre block, from which it is believed that no less than 1,400 tons will be cut; and already there has been sent to the mill 152 tons of Cheribon 18-months-old cane from 2½ acres. Messrs. Bates have 55 acres, from which they confidently anticipate a return of 1,500 tons of cane.

One would like to hear something more of the methods which have produced these fine returns, and that, unfortunately, is a part of the story that is not often published with the statement of heavy tonnages. The "Mail" representative, in the case of Messrs. Bates, has told us that it has been due to "agitation"—he might almost have said "labour agitation"; but then it is agitation, not with the tongue, but with plough and scarifier, which is quite another thing. They also make a practice of turning in weeds and other humus-producing growth, thus maintaining the fertility of the soil. No artificial manure has been found necessary in their red volcanic soil, though 27 years under cane. Their best crop is 7 acres of Cheribon, which is now giving 45 tons to the acre, some of the stalks being 16 ft. in length.

In reply to a letter of inquiry as to the conditions associated with the growth of a patch of 10 acres of cane on Bonna, from which phenomenally heavy returns were being received, Mr. F. Buss sends us the following:—"With regard to the 3 acres of this patch already cut, and which gave an average of 98 tons to the acre, it was planted with D1135 cane in 5th December, 1908, and cut in the first week of August, 1910. It had been dressed with filter press cake, wood ashes, and refuse lime to a depth of 2 to 3 in., and ploughed in. When planting, they put into the drills—A mixture of sulphate of potash, 1½ cwt.; Shirley's fertiliser, 4 cwt.; superphosphate, 1 cwt.; and sulphate of ammonia, ½ cwt. The balance of 7 acres (of the 10-acre plot) produced 361 tons 11 cwt., equal to 51 tons 13 cwt. per acre. This portion had no fertiliser manure, but it was ploughed and cross-ploughed five times to a depth of 13 in. Rainfall for the year, 42 in. The soil of Bonna is river bank black alluvial."—"Australian Sugar Journal."

LEGITIMATE RUBBER-GROWING NOT AFFECTED BY BOOM'S COLLAPSE.

Mr. A. W. Prautch, representative of the Philippine Government in charge of the exhibit at Singapore, writing for the "Manila Times," says:—

Despite the failures caused by speculation in rubber shares, there is no reason for those who have contemplated planting rubber to withdraw from that intention, although the market price of rubber has had a sudden drop. Rubber will grow on suitable land anywhere in the tropics to an altitude of 3,000 ft., as is proven by prosperous plantations from Ceylon to Hawaii. Plantation rubber can be produced for less than wild rubber can be gathered in Brazil or Africa, and the danger of over-production is so remote that owners of bearing plantations are not at all worried over that outlook.

The demand is increasing daily, and for many years will be greater than the supply. Clear thinkers in the rubber business would welcome a lower but steady price, arguing that rubber at a reasonable price will discourage artificial rubber, while multiplying uses that are now prohibited by high prices. The possibility of synthetic rubber is admitted; but, with rubber being produced on the plantation for 37 cents gold per lb., the chemical process rubber probably cannot compete.

In 1908 the price of the best raw rubber was 93 cents gold; in 1909, 1·62 dollars; and in April, 1910, it was 3·20 dollars. The reports of the following companies show what this increase in prices brought to investors in their shares, all being 2s. at par, except the last three, which were £1 when issued:—

Company.	December, 1909.			April, 1910.		
	£	s.	d.	£.	s.	d.
Anglo Malay	0	15	9	1	18	0
Cicely	1	7	6	3	0	0
Linggi	1	6	9	3	7	0
Pataling	1	8	6	3	17	0
Selangor	1	18	0	4	5	0
Vallambrosa	1	5	9	2	15	6
Bukit Raja	2	0	0	22	0	0
Cons. Malay	7	0	0	17	0	0
Fed. Selangor	8	0	0	18	0	0

These companies in 1909 paid from 165 to 288 per cent.; and, as the price in rubber doubled, they simply paid dividends as a surplus accumulated until they drove speculators to frenzy and thousands of mushroom companies sprang up to divide the patronage of investors with sound new companies who could not make lurid promises in their prospectuses.

Any sound investment in rubber-planting in the Philippine Islands, where money is spent legitimately on suitable land with economic hand and business sense, has no chance of loss, but should return dividends of 20 per cent. a year on the investment. The high price of rubber may pass, but, as rubber is being produced for 37 cents gold per lb., and probably never will bring less than 1·50 dollars per lb. in the market, the failure of a bank here and there can have nothing to do with a legitimate planting industry.

Rubber is not a pastime that can be taken up for a few months, nor can results be obtained by haphaazrd planting. Rubber will not hold its own against cogon, weeds, or brush. It takes five years of care to produce the first pound of rubber; and, while plantations have paid all expenses by crops grown beneath the young trees, it was brains, unflagging application, and plenty of capital that brought this about.

Para rubber seeds properly packed will cost 7 pesos per 1,000 in Manila; and the proper season for seed is from September to December. They should be sprouted in a nursery, and set out in rows 20 ft. apart each way. The young trees must be protected against hogs and deer, and the ground kept

clean beneath them. Small plantations can be established; and a few hundred trees, 109 to the acre, can be cared for without great outlay.

No special interest has been taken in rubber here; and I am informed that 9,000,000 dollars of American capital that sought investment here found no plantations existing nor any interest in rubber-growing, and so went elsewhere.—"Mindana Herald."

DRYING THE SMYRNA FIG.

A correspondent asks us to describe the method of drying figs after the style of those which are imported in small boxes and called "Smyrna Figs." As we only received his letter on the 28th September, we were unable to supply the information in the October issue of the Journal. The famous dried fig of Smyrna is locally known as the "Sari lop," and is a product of the Meander Valley, in the districts of Inovassi and Ortaxe (close to Antioch). The lastnamed district produces a fig superior to all others in size, richness of pulp, and thinness of skin. All attempts to produce it successfully elsewhere than in the Meander Valley have failed, even in valleys in the immediate neighbourhood.

Young trees produce the finest fruit. The fig is allowed to remain on the tree until it begins to drop off, when the crop is either gathered by hand or knocked off by sticks.

The partially dried fruit is spread on mats to dry in the sun for three or four days, and is then sent to market. The operator, in working the figs for packing, dips his fingers into brine to prevent them from becoming sticky. The salt, beside destroying the worm to which the dried fig is subject, and acting as a preservative, is supposed to help in the sugaring process.

Some recommend immersion in boiling brine as a means of sterilisation. In this case, the figs are put into baskets or into perforated metal drums and immersed for about five minutes in the boiling brine. It is contended, however, by others that this process alters the taste of the fig, and spoils those of the finer quality. The figs, when ready, are shipped in small boxes or bags.

The peculiarity of the Smyrna figs is that, under favourable conditions, their skins dry tender, which is not the case with other varieties, and, as a dried fig cannot be peeled, its skin influences its quality and market price considerably. A well-known authority on fig-drying wrote about three years ago to a Cape journal describing the method of drying Smyrna figs. The figs, he explained, should be pressed when fully ripe, and spread out, unpeeled, on drying-trays in the sun, with a slight powdering of sulphur. After the third day, they should be turned daily. When sufficiently dried (after from six to eight days), they should be dipped in a boiling solution of brine—1 lb. of common salt to 10 gallons of water. Then, after being spread out in the sun for a few hours, they are ready for packing. They should be packed in layers in boxes, with a neatly folded lining of white paper. It must be borne in mind that only the very best fruits should be dried. There is no greater mistake than to suppose that imperfect, inferior fruit will make other than second or third rate produce when dried. The boxes should contain 2, 4, 6, or 8 dozen figs.

Another expert in the fig-drying business says:—

Do not gather the fruit until all growth has positively ceased, and the fruit hangs with a cracked, withered, and shrunk skin.

Place the fruit, eye upward, on latticed trays, and sulphur at the rate of 6 oz. per square yard for 30 or 40 minutes, according to the size of the fruit. Place the trays in the sun on such material as will reflect the greatest heat. A variable temperature to, say, 40 degrees usually produces sourness; hence the necessity for keeping the fruit warm at night by covering.

The covering should be of boards or close canvas, strained tent-like over the drying floor. In no case should rain or dew fall on the fruit.

It is rarely possible to lift the fruit bodily. It requires going over day by day to remove the dried ones. They should always be lifted warm to prevent sourness.

When the whole parcel has been collected into a box, leave them for three or four days to cool; then carefully search for sour specimens. Class them at the same time. Now, with the boxes and fruit ready for packing, prepare a solution of salt and water (1 lb. salt to 2 gallons water), at a temperature of about 140 deg. Fahr.

[It will be noted here that the writer recommends a much stronger solution of brine, and that it be not at boiling point, as is recommended by the former expert.]

The fruit requires to be immersed in this solution. (One expert says that this injures the taste of the fruit, so we would advise our correspondent to make small experiments before dealing with the bulk of the crop.) By immersing, dipping is understood. Then the fruit is shaped, pressed, and fed into the box as directly as possible. It must be the aim of the packer to make the skin flexible, and hide any harsh patches by packing the fruit evenly, neatly, and firmly.

For sulphuring, there will be required a bottomless cabinet, 5 or 6 feet high, of a width equal to the length of the tray, and depth a little more than the width of the tray. Place ½-lb. of sulphur in a pan beneath the tray; ignite with a hot coal; burn without much fire to avoid too great a heat. The above quantity will be sufficient to sulphur 40 lb. of fruit in about 40 minutes.

NOTE.—Dipping in lye is exploded, as it toughens the skin. It is a good plan to slit the fruit lengthwise with a sharp knife on the under side (into the eye only, not right through) to facilitate even drying. If this be not done, the fruit may look perfectly cured on the outside, and yet be fermenting in the centre.

White Genoa and White Marseilles are the best figs for drying purposes.

A MILK-PRESERVING MACHINE.

The Board are informed by the Foreign Office that a machine was exhibited at the Bordeaux Agricultural Show in May, 1910, for preserving milk by a novel process. The fluid is treated at a very high pressure, and, after being pasteurised, will keep for an indefinite length of time. A sample was exhibited which was said to have been fifteen months in bottle, and remained perfectly sweet uncorked for several days in thundery weather. The treatment to which it is subjected crushes the fatty globules and mixes them so closely with the watery components of the milk that they cannot again be separated; cream cannot therefore be obtained, but the preservative qualities obtained by the method may make it useful for purposes of storage on long voyages. The machine was patented about three years ago.—"Journal of the Board of Agriculture."

Science.

BANANA MANURING EXPERIMENTS.

(Third Progress Report).

By J. C. BRÜNNICH, Agricultural Chemist.

At the time of my last visit to the Buderim Mountain the banana experiments were about eleven months old, and the first bunches are just ripening. The second series of photographs of the experiments were taken in May, when the stools were about seven months old, and they showed on all the manured plots a healthy and promising condition of the stools, leading to almost too sanguine a report, as the plants were examined at their most flourishing period before the winter had set in. The winter is undoubtedly the greatest test of the health and vigour of a banana plantation, and for this reason the appearance of the experiments at my recent visit more truly indicates the actual condition of the plots.

As the winter was an exceptionally mild one, the appearance of the experiments on Mr. Guy's plots, on the south end of the mountain, was rather disappointing, as the majority of first bunches will not mature, being so-called blind bunches. The banana sucker, as soon as the bunch appears, seems to lose its vitality, the leaves are dropping off, and the stack bends over, and even breaks off, as if it had not enough strength to support the bunch. Of course this condition is particularly prevalent in the unmanured and lightly-manured experimental plots, but even in the heavier manured plots the results are not as good as I expected from the healthy appearance of the suckers in May.

Far more promising are the results of the experiments on Mr. Foote's experimental field on the north end of the mountain. The difference between the unmanured, lightly manured, and heavily manured plots is very striking, and only the former show a notable percentage of blind bunches. On the plots which received double weights of manure the health of the stools is very apparent, and the yield and size of bunches is quite as good as could be expected for a first crop, even from fair quality new land. The stools suckered well, and the number of second suckers averages about two for each of the stools of the manured plots, but only about one and a half, and only weakly ones, for the unmanured plots.

The percentage number of blind bunches and of second suckers may be seen from the following table, but the actual financial result will have to be obtained from the carefully kept records of the owners of the experimental blocks, for which purpose number, size, and approximate market value of the bunches coming from each experiment have to be taken into account:—

—	Cost per Stool.	Foote's Experiment		Guy's Experiment.	
		Blind Bunches in each Hundred.	New Suckers in each Hundred Stools	Blind Bunches in each Hundred.	New Suckers in each Hundred Stools.
	d.				
1. KPN (superphosphate) (blood)	$2\frac{3}{4}$	11	202	50	196
2. (KPN) (blood)	$5\frac{1}{2}$	0	229	29	236
3. $\frac{1}{2}$ (KPN) (blood)	$1\frac{3}{8}$	24	*194	57	168
4. No manure	0	24	*134	43	157
5. $\frac{1}{2}$ (KPN) superphosphate nitrate	$1\frac{1}{3}$	8	*158	25	200
6. 2 (KPN) basic slag nitrate	$6\frac{1}{4}$	3	202	7	203
7. KPN slag nitrate	$3\frac{1}{8}$	5	200	29	194
8. KPN superphosphate ammonia sulphate ...	$2\frac{3}{4}$	8	198	18	218
9. 2 (KPN) superphosphate ammonia sulphate ...	$5\frac{5}{8}$	5	195	18	190
10. KPN basic slag ammonia sulphate	$2\frac{5}{8}$	5	184	18	157

* Suckers small.

The results show clearly that only the double amounts of manure seem to give sufficient stamina to the stools, and that in the case of a much more severe winter the difference between the experiments would have been more marked. In order to make the experiments successful it is absolutely necessary that the experimental stools receive another dressing of manure, to be applied at the end of the rainy season in February or March, to carry them over the winter.

It is a matter of great difficulty to account at present for the great difference in the results of the experiments in the two blocks, and there can be no doubt that one or more of the important factors of productiveness—*position*, *soil*, and *moisture*—must be different.

We knew quite well that Mr. Guy's land was in an extremely exhausted state—even weeds would not grow properly on it; the crop of green manures was, in spite of manuring, very patchy, and the cultivation, particularly the subsoiling, was not quite as thorough as we wished. A portion of the experimental block suffered considerably by a wash-away after heavy storms, and the position is less sheltered and more exposed to the cold winds than the experiments on the north side of the mountain.

The soil of Mr. Guy's experiments appeared also to contain less moisture than the soil of Mr. Foote's block, and I consider it very necessary to shelter the soil in the first experimental block by growing a leguminous crop between the rows and mulching the stools with part of this crop. The labour necessary to keep the cultivation clean will be reduced to a minimum and the soil itself protected. There can be no doubt that one of the chief advantages of the newly planted scrub lands on the mountain sides lies in the fact that the virgin land contains an enormous amount of easily available plant foods—phosphoric acid, potash, and nitrogen (as shown by the analysis of the virgin scrub soil on Mr. Guy's plantation published in my annual report), and that the ground is more or less sheltered by tree stumps, stones, &c.

A second series of experiments has just been planted in each of the two blocks, and the experiments will be arranged in a slightly different manner. All the experiments, with the exception of two, have the same amount of manure, namely:—

$$\left.\begin{array}{l} K = 160 \text{ lb. of potash} \\ P = 80 \text{ lb. of phosphoric acid} \\ N = 40 \text{ lb. of nitrogen} \end{array}\right\} \text{per acre,}$$

corresponding to the original experiments Nos. 1, 7, 8, and 10.

In addition, one-half of the experiments received a good application of lime, at the rate of 2 tons per acre, and some of the rows also an application of 2 cwt. common salt per acre, as potassium chloride, which I wished to use in preference to the sulphate for some of the experiments, was not obtainable in Brisbane.

The second manurial blocks will also be mulched with green manures grown on adjoining piece of land. These second series of experiments should, like the first, receive a second dressing of manure in February or March. The principal object of this new series of experiments is to ascertain the relative manurial value of nitrogen in the form of dried blood, nitrate of soda, and nitroline. Nitrogen, in the form of ammonium sulphate, seems to be the least suitable for banana culture.

The planting and manuring of the second series of experiments were all completed under the supervision of Mr. Keogh early in October, so that the suckers have a better chance than those planted last year.

The experiments will have to be continued for four years before any definite conclusions can be drawn.

SCIENCE NOTES.

THE RAIN-TREE OF PERU (Pithecolobium Saman).

When Marco Polo returned from the East and wrote a book on his travels, he was discredited by his own countrymen. When the Portuguese adventurer, Mendez Pinto, extended his discoveries beyond the realms visited by Marco Polo, and reported the wonders he had seen, Cervantes styled him the "prince of liars." Later on, when the Dutch, after their return from their first voyage to the East Indies, gave to their countrymen a description of a marvellous tree producing rain in abundance, they were laughed at, and were told to carry their stories elsewhere.

All those travellers are now known to have told the truth, or, at any rate, to have only exaggerated slightly.

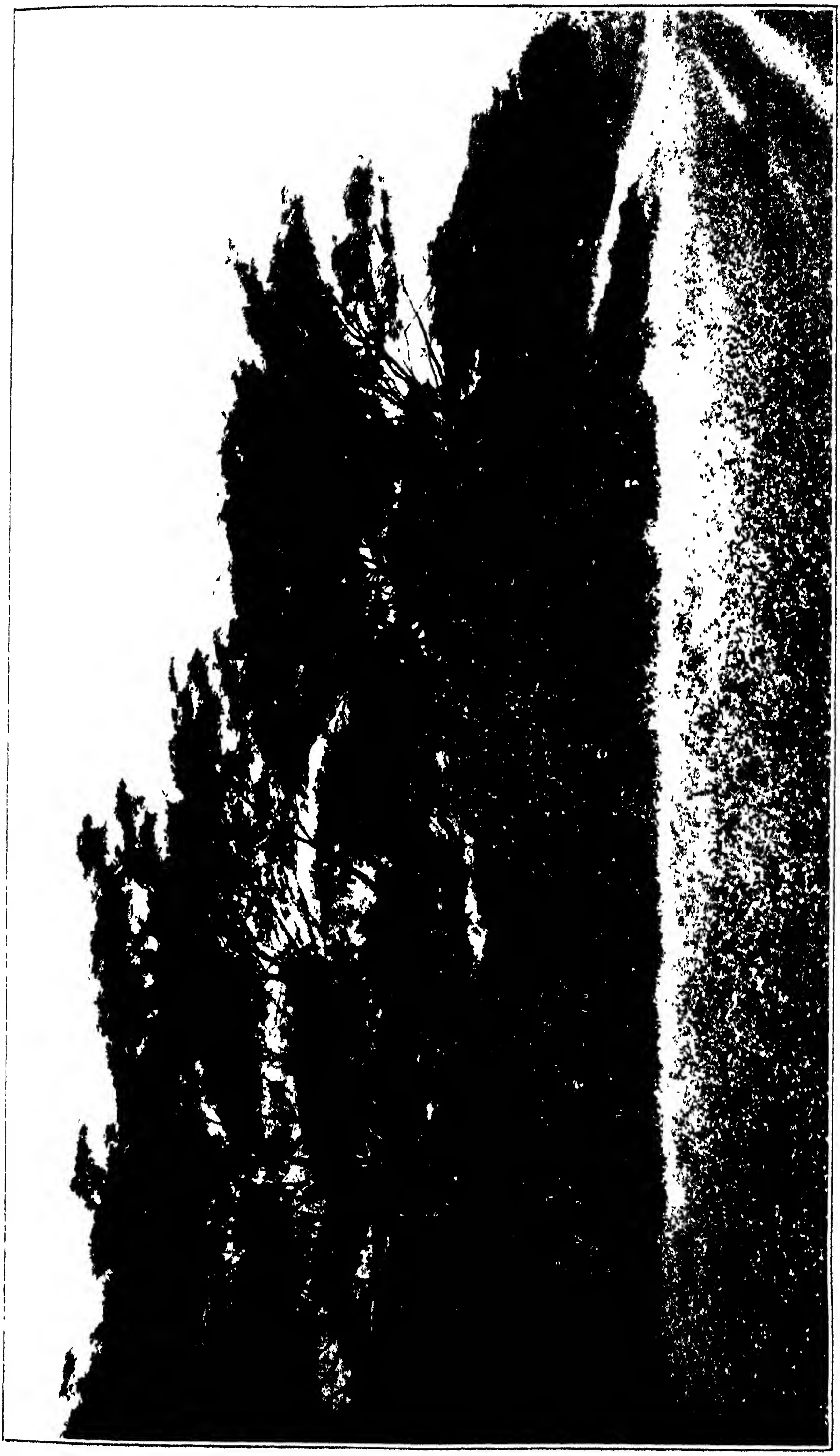
Now (says the "Australian Magazine," from which these notes are taken), with reference to the Rain-tree; if there be any truth in the account, that tree would, at least, put all other rain-producing methods into the shade, and an investigation as to its properties should, at any rate, be made.

The original Dutch account may be found in an extremely rare French work, published at Rouen in the year 1725, entitled "Voyages de la Compagnie." The writer of the article we quote (Mr. George Collingridge), says he had known the description for many years, and, believing it to be only a wild sailor's yarn, 'never gave it a second thought until quite recently, when I found the statement corroborated in other quarters. When the Dutch made up their mind to follow in the wake of the Portuguese and try their fortunes in the East Indies, they equipped a fleet of four vessels and set sail for Java. On the 19th of April, 1595, they sighted the Canary Islands. There, on Hierro Island, the western-most of the group, which they found very arid, they came across the Rain-tree. They say: 'As a compensation, and by an admirable design of Divine Providence, there grows everywhere on this island a tree of a reasonable height, that has not its like in any other known quarter. The leaves are long and narrow and always green, without ever fading. A small cloud hovers constantly over the tree and wets the leaves with dew to such an extent that clear and sparkling water flows continually from them. The water is collected in tubs, which the inhabitants place under the trees and all around. The quantity of water thus provided is not only sufficient for all the wants of the inhabitants, but serves also for their cattle.'

"Allowing for a certain amount of exaggeration, the Rain-tree must still be a wonderful tree, and would prove a useful acquisition in a dry country like Australia. I have made inquiries about its existence on Hierro Island, and, unfortunately, I find that it has ceased to exist there. I have heard, however, that it has been found again quite recently in an isothermal line of vegetation, in Central America, and its reappearance is described by a correspondent of mine, who says that it is the latest novelty reported from where he writes (Bogota), and that the Consul of the United States of Columbia tells him that in the woods of the environs of Moyobamba this marvellous tree is called a 'Rain-tree' by the natives, and that it possesses some of the following remarkable qualities:—'It is about 50 ft. in height when full grown, and about 10 in. through at the ring, and has the peculiar property of absorbing an immense quantity of humidity from the atmosphere, which it concentrates, and subsequently pours forth from its leaves and branches in a shower, and in such abundance that in many cases the ground in its neighbourhood is converted into a perfect bay. It possesses this curious property in its greatest degree in the summer, precisely when the rivers are at their lowest and water most scarce; and my correspondent tells me that it is proposed that it should be planted in the more arid regions of Peru for

THE RAIN-TREE, FROM AN OLD ENGRAVING.

Plate XV



the benefit of the agriculturists.' The properties of this tree appear to be of a nature well worth inquiring into. Who is going to do it?"

We have seen several large Rain-trees growing in an avenue at the Government Station at Rigo, 30 miles from Port Moresby, the seat of Government in British New Guinea. The trees are of great height and their peculiar rain-dropping characteristics are well known to most people on the south coast of Papua. The remarkable "18th century" woodcut here reproduced conveys a faint idea of the drooping branches and leaves of the tree, from which, at certain seasons, water drips in considerable quantities. The singular cloud effect shown by the artist of the past age, I have not observed, except that, when damp mists occurred, the head of the tree, as of all other trees in the neighbourhood, was obscured. The Papuan trees were probably brought over from Java at the time when the missionaries first settled in New Guinea.—[Ed. "Q.A.J."]

A HYBRID COTTON.

Dr. C. E. Gooding, of Stirling Plantation, Barbados, has been conducting experiments in the direction of procuring hybrids between Sea Island cotton and the ordinary native cotton of the perennial type. In July, 1908, a seed from a large and hardy native cotton tree was planted, and in the following January, when the plant was well grown, some of its flowers were pollinated with pollen from a good strain of Sea Island cotton, the procedure being to emasculate and bag the flowers of the native cotton on the evening preceding then opening; then to pollinate them from Sea Island flowers, and finally to bag them for 24 hours. All the flowers so treated produced healthy bolls, which duly came to maturity.

When ripe, the seeds from these bolls were divided into two lots—one of which was planted by itself in April, 1909; and the other, with other cotton seed, under ordinary field conditions, in the following July. The plants—especially those sown in April—attained a large size, but this extra growth had been anticipated and allowed for, by setting them much farther apart than Sea Island cotton is usually planted. The results may be summarised thus—

	Months' Growth.	No of Trees	Yield of Seed Cotton. Lb	Seed Cotton per Tree. Lb.	
Early planted hybrids ..	13	45	177	3·93	Exactly similar field conditions.
Late planted hybrids ...	9½	25	35	1·40	
Sea Island	9½	...	..	0·22	

The results demonstrate that, under exactly similar conditions, the yield of hybrid cotton was much higher than that from the ordinary Sea Island. In terms of weight per acre, it was more than twice as great, for, working out the results in this way, Dr. Gooding shows that the number of trees per acre and the yield of seed-cotton per acre were as follows:—Early planted hybrids, 648 and 2,549 lb.; late planted hybrids, 1,210 and 1,694 lb.; and Sea Island, 3,630 and 795 lb. In order to gain information as to the quality of the lint, a special report was obtained on the cotton. This showed that those of the hybrid and Sea Island types were both practically the same, as the lint was of excellent length, strength, and fineness, and the same price was obtained for both kinds. Further experiments are required to show if heavy bearing is a definite property of the strain obtained, or whether it is due to the stimulus of crossing, and a greater immunity from disease, of the hybrids.—"West India Commission Circular."

Animal Pathology.

PRODUCTION OF HOG CHOLERA SERUM.

The Department of Animal Pathology of the University of Nebraska, U.S.A., has published the following leaflet on the production of hog cholera serum, which will no doubt interest those of our readers who are breeding swine.

The last Legislature made an appropriation of 5000.00 dollars to be used in the production of hog cholera serum by the methods recommended by the Bureau of Animal Industry of the United States Department of Agriculture. This work is under the direction of the Department of Animal Pathology of the Nabraska Experiment Station.

In producing the serum, pigs are used that are immune to cholera either by having recovered from an attack of this disease or by having been inoculated. These pigs are then made hyperimmune* by injecting under the skin large amounts of blood taken from a hog sick with cholera.

Two methods of hyperimmunising are used:—(1) The slow method, by which increasing amounts of virulent blood are injected at regular intervals; (2) the quick methods, by which a large amount of virulent blood is injected at one time.

The latter is the method used at present. Three weeks after injection the pig is bled from the tail, the clot removed from the blood, and the serum is ready for use.

Hyperimmune pigs are bled four times at intervals of one week, and at the end of the next week are bled to death in order to secure the largest possible amount of serum.

Two methods of inoculation are used in immunising pigs against cholera:—

The Serum-Simultaneous Method.—The pig is injected subcutaneously with the correct dose of serum for its weight, and at the same time receives a small amount of virulent blood. This method produces a slight reaction, and the pig acquires the same immunity that it would by having recovered from natural infection. This method is not recommended at present.

The Serum-Alone Method.—By giving the serum alone to well pigs they are given immunity for a few weeks only. If the serum alone is used at once on the well pigs as soon as cholera is discovered in a herd, the natural infection at this time will give the same immunity that is given by the Serum-Simultaneous Method.

In the production of serum, a 125-lb. hyperimmune pig will furnish, at each of four bleedings, 550 c.c. (cubic centimetres) of serum and at his death 1,300 c.c., making a total of 3,500 c.c. The dose of serum for a 125-lb. pig is 30 c.c., so that the average total production from a 125-lb. hyperimmune pig is about 115 doses for pigs of equal weight.

When it is understood that it takes the blood of a cholera pig of equal weight to hyperimmunise every pig used for the production of this serum, some idea may be had of the cost. Other features of expense are that a small percentage die from hyperimmunising, and some of the checks (pigs given cholera to furnish virulent blood) die unexpectedly, before they are bled from the throat, and are thus a total loss.

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* By "hyperimmune" is meant "more than immune." The blood of a "hyperimmune" hog has more resisting power (immunity) against hog cholera than that of the ordinary immune hog.

The dose of serum recommended is as follows, the amounts being given in cubic centimetres:—

Under	50 lb.	15 c.c.
	75 lb.	20 c.c.
	100 lb.	25 c.c.
	125 lb.	30 c.c.
	160 lb.	35 c.c.
	200 lb.	40 c.c.
	250 lb.	45 c.c.
	300 lb.	50 c.c.
	350 lb.	55 c.c.
	400 lb.	60 c.c.

With the present plant and appropriation, it is impossible to supply the demand for this serum, and on account of the high cost it will be sent only upon application of veterinarians for use in those herds where there is an outbreak of cholera. Where cholera is suspected, a qualified veterinarian should be called to kill one or two of the sick pigs and make a *post-mortem* examination to determine if genuine cholera exists.

The serum for inoculation will then be sent direct to the veterinarian making the examination, who should do the vaccinating. The request for serum should give the number of pigs and *their average weight*. In giving the number of pigs, no account should be taken of those sick, as experience has shown that the serum is of doubtful benefit in these cases. Until the cost can be greatly reduced, the serum should be given only to those pigs apparently well, in sick herds.

The records so far show that 75 per cent. of such pigs live by this treatment.

No charge is made for the serum. The services of the veterinarian employed should be paid for by the owner of the herd.

MANAGEMENT OF CHOLERA HERDS.

Carcasses of hogs which have died from cholera should be immediately burned or buried deeply and covered with quicklime. Separate the sick from the well hogs, and divide the well hogs into two or more groups and separate them as widely as practicable. As the germs of cholera gain access to the system only through the digestive tract, the line of prevention is well marked. All feed and drinking troughs should be thoroughly cleaned and disinfected. If the troughs are of metal, holding them over a blaze will be effective. Streams that do not rise on the home farm should be suspected as a possible carrier of infection, and for this reason water from wells should be given. Feed sparingly. Where hog cholera serum is used, the hogs should remain in the infected yards.

Chemistry.

THE SOILS OF THE UPPER BURNETT.

By J. C. BRÜNNICH, Chemist to the Department of Agriculture and Stock.

Towards the end of last year, Crown Lands Ranger A. E Winterford, under instructions of the Hon. Secretary for Agriculture and Stock, made a collection of soils from various parts of the Upper Burnett district.

The analyses of these soils have just been completed, and the great majority are found to be soils of quite exceptionally high fertility.

Some of the soils, like Nos. 1, 8, and 9, contain an extraordinary high amount of potash, and even the amounts of this valuable plant food in the soils Nos. 2, 11, 12, and 13 are very much higher than usually found. Although the total amounts of potash are so high, the available amounts are not correspondingly high, only in the soils Nos. 8 and 11 very good.

The amounts of lime, in which so many of our Queensland soils are deficient, are nearly in all soils remarkably high, and also in a very available form.

I may here explain that in the table of analyses the total amounts of plant foods soluble in hydrochloric acid, the usual agricultural analysis, are given, as well as the available plant foods, determined by the extraction with dilute citric acid solution, according to Dr. Dyer's method. In order to make the table more comprehensive, the amounts of the total and available plant foods are calculated in pounds per acre in the soil to a depth of 12 inches.

The geological sketch map does not give many details of this district, but shows that the country belongs to the Gympie formation of the Permo-carboniferous system, with occasional outcrops of desert sandstone (upper cretaceous system) and basalt, and that the Middle Devonian formation also encroaches at the head of the district. This shows that the soils are of a very mixed origin, and also accounts for the high amounts of lime.

The black soils, more particularly Nos. 1, 2, 4, 7, 14, and 15, are inclined to be rather stiff, although they contain a high amount of humus, far more than the black soils of the Darling Downs, and I have no doubt that cultivation will improve the texture of these soils considerably, and would make them easier to work.

The soil No. 11, from black-soil flats, Rawbelle, although very high in lime, contains only a very small amount of available potash, is low in nitrogen, and rather too high in magnesia salts, all of which may account for the fact that lucerne is doing poorly on adjoining land; but I believe that this soil will also be much improved by working

The red soil, No. 19, taken from Red Soil Ridge, near Rawbelle Head Station, is a much lighter soil, much richer in available phosphoric acid and potash, although low in nitrogen, and an excellent crop of maize is grown on similar adjoining land.

The change from black to red soils, with intermediate light-brown and chocolate soils, is very interesting, and may be seen on the sketch map attached to this report, in which the places where the soil samples were taken are marked, and coloured diagrams show the class of soil and subsoil to a depth of 12 inches in each place.

The whole of the district should prove of excellent fertility. The black-soil flats should be particularly suited for lucerne growing. The lighter soils are suitable for almost any crop, chiefly, however, for potatoes, maize, sorghums, cereals, or mixed farming in general. The district is a splendid dairying, breeding, and fattening country.

General Notes.

SHOW DATES FOR 1911.

We have received from the secretary of the Queensland Chamber of Agricultural Societies, Mr. C. A. Arvier (secretary of the Queensland National Association), the following dates of shows for 1911:—

Goondiwindi.—Macintyre River Pastoral and Agricultural Association, 5th and 6th April.

Ipswich.—Queensland Pastoral and Agricultural Society, 26th and 28th April.

Killarney.—Killarney Agricultural Society, 8th and 9th February.

Brisbane.—National Agricultural and Industrial Association, 7th to 12th August.

Stanthorpe.—Border Agricultural, Horticultural, Pastoral, and Mining Society, 2nd and 3rd February.

Roma.—Western Pastoral and Agricultural Association, 9th and 10th May.

Kingaroy.—South Burnett Agricultural, Pastoral, and Industrial Society, 19th and 20th April.

Brisbane.—The Queensland Chamber of Agricultural Societies, secretary, C. A. Arvier.

KEROSENE EMULSION.

Take 1 pint kerosene, 2 oz. common soap, ½-pint rain water. This will make 1½ pints of emulsion. Cut the soap, if hard soap be used, into thin slices, so that it will dissolve easily in the proper amount of rain water when heated to boiling point. When all is dissolved, pour the boiling solution into a vessel containing the kerosene and churn well. The emulsion should not be diluted until required for use, when hot (rain) water, if possible, should be used. The final strength of the emulsion must depend upon the trees or plants it is to be used upon. A very strong wash for winter use is 1 part kerosene to 20 parts of water. For trees in foliage, 1 part emulsion to 30 or even 25 would be strong enough.

Answers to Correspondents.

FARM IMPLEMENTS, COWPEAS, AND SORGHUM.

A. W. Allan, Pratten—

1. A disc harrow is regarded as more of a general purpose implement than the true cultivator, but is heavier in draught; and, since you say that your team is a light one, it may be advisable to adopt a 13-spring-tooth riding cultivator, with the wheels of sufficient height to admit of clearance of any trash. Fine and broad tyres are obtainable with the latter machine, which can be used as a corn cultivator when the crop is young, if the drills are set out so as to prevent the wheels encroaching on the drills of corn.

We do not make a practice of recommending any particular brand of machine. An essential feature of these machines is to secure a make with a good pressure spring.

2. Thos. H. Wood and Co., George street, Brisbane, quote clay-coloured cowpeas at 17s. 6d. per bushel f.o.b. Brisbane.

An ordinary seed drill will sow cowpea seed; but some are inclined to crack odd seeds, and this should be allowed for. It takes from 10 to 12 lb. of seed to sow an acre in drills 3 ft. apart.

3. The clay-coloured cowpea is a good standard variety, and is suitable as a forage crop for stock, which do well on it, if the vines are cut and allowed to wilt for from 24 to 36 hours before using. Some people call cowpeas "Poor Man's Bean"; but the *Dolichos Lablab* is the bean generally known by that title.

4. The best results are obtained by allowing sorghum to come into ear, and use just when the seed is in the milk stage. If it has to be used before this, allow it to wilt slightly in order to allow the poisonous principle to pass off, which it will quickly do, being extremely volatile.

NUMBER OF PLANTS PER ACRE.

"BANANA," Cairns—

The best answer to your several questions is the following table, which gives you the number of plants which can be set to the acre at given distances:—

Feet.		Feet	
2 x 4	5,445	12 x 12	302
2 x 5	4,356	12 x 16	227
3 x 4	3,630	12 x 18	201
3 x 5	2,904	15 x 15	193
3 x 6	2,420	16 x 16	170
4 x 5	2,178	18 x 18	134
4 x 6	1,815	18 x 24	100
6 x 6	1,210	20 x 20	108
6 x 8	907	20 x 24	90
8 x 8	680	20 x 30	72
8 x 9	605	24 x 24	75
8 x 10	544	24 x 30	60
9 x 9	537	30 x 30	48
9 x 10	484	30 x 36	40
9 x 12	403	30 x 42	34
10 x 10	435	36 x 36	33
10 x 12	363	40 x 40	27

To ascertain the number of plants required for an acre at any given distance, divide 43,560 (the number of square feet in an acre) by the distance between the plants in the rows multiplied by the distance between the rows. Example: Plants set in rows 4 ft. apart with plants 2 ft. apart in the rows gives each plant 8 square feet; 43,560 divided by 8 gives 5,445 plants per acre.

As far as bananas are concerned, plant about the beginning of the rainy season—January. The holes should be from 1 to 2 ft. deep, and from 1 ft. to 18 in. in diameter. Cavendish bananas may be planted from 12 to 16 ft. apart each way (302 or 170 per acre). Larger growing varieties, such as sugar and lady's finger, require from 20 to 25 ft. apart (108, or about 70 per acre).

The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	OCTOBER. Prices.
Apples (Tasmanian), Eating, per case	6s. to 12s.
Apples (Cooking), per case	3s. to 6s.
Bananas (Cavendish), per dozen	4d. to 6d.
Bananas (Sugar), per dozen	2d. to 3½d.
Cape Gooseberries, per case	..
Citrons, per cwt.	10s.
Cumquats, per quarter-case	1s. to 2s. 6d.
Custard Apples, per quarter-case	..
Gooseberries, per quarter case	4s. 6d. to 6s.
Lemons (Lisbon), per case	3s. 6d. to 4s. 6d.
Mandarins, per half-case	4s. to 6s. 6d.
Mangoes, per case	..
Nectarines, per half-case	..
Oranges (Local), per case	4s. 6d. to 6s.
Papaw Apples, per quarter-case	1s. to 2s.
Passion Fruit, per quarter-case	4s. to 6s.
Peanuts, per pound	2¾d. to 3d.
Peaches, per quarter-case	...
Pears (choice), per quarter-case	3s. 6d. to 5s.
Persimmons, per gin case	...
Pineapples (Ripley), per dozen	8d. to 1s.
Pineapples (Smooth), per dozen	1s. 6d. to 3s.
Pineapples (Rough), per dozen	8d. to 1s.
Quinces, per case	...
Rosellas, per sugar-bag	...
Strawberries, per dozen pint boxes	3s. to 6s.
Tomatoes, per quarter-case	4s. 6d. to 5s.
SOUTHERN FRUIT MARKET.	
Apples (Local), choice, per case	6s. to 7s.
Apples (Jonathan), per case	7s. 6d. to 9s.
Apples (Cooking), per case	3s. to 4s.
Bananas (Queensland), per bunch	3s. to 4s. 6d.
Bananas (Queensland), per case	12s. to 16s.
Bananas, G.M. (Fiji), per bunch	4s. to 5s.
Bananas, G.M. (Fiji), per case	10s. to 17s.
Cocoanuts, per dozen	2s. to 2s. 6d.
Grapes, per box	...
Lemons (Italian), per half-case	...
Lemons (Local), per gin case	4s. to 4s. 6d.
Mandarins (Thorneys), choice, per half-case	3s. 6d. to 4s.
Mandarins (Queensland), Emperors, per bushel case	7s. to 8s.
Oranges (Local), choice, Navels, per bushel case	5s. 6d. to 10s.
Oranges (S. Australian), per bushel case	5s. 6d. to 6s. 6d.
Passion Fruit (choice), per half-case	3s. to 6s. 6d.
Peanuts, per lb.	...
Pears (Victorian), choice, per bushel case	8s. to 17s.
Pears (Tasmanian), per quarter-case	8s. to 12s.
Persimmons (choice), per half-case	...
Pineapples (Queensland), Ripley, per case	4s. 6d. to 5s.
Pineapples (Queensland), common, per case	4s. 6d. to 5s.
Pineapples (Queensland), Queen's, per case	4s. 6d. to 5s.
Tomatoes (Queensland), per half-case	3s. to 4s. 6d.
Water melons (Local), large, per dozen	...
Water melons, medium and small, per dozen	...
Strawberries (Queensland), per 3-quart tray	2s. 6d. to 5s.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR NOVEMBER.

Article.		OCTOBER. Prices.
Bacon, Pineapple	lb.	...
Barley, Malting	bush.	3s. 6d.
Bran	ton	£5 5s.
Butter, Factory	lb.	8½d. to 9d.
Chaff, Mixed	cwt.	1s. 6d. to 3s. 8d.
Chaff, Oaten	ton	£4 10s.
Chaff, Lucerne	cwt.	1s. to 2s. 9d.
Chaff, Wheaten	„	1s. 6d. to 2s.
Cheese	lb.	5½d. to 6¼d.
Flour	ton	£10 5s.
Hay, Oaten	„	£5 15s. to £6.
Hay, Lucerne	„	£2 10s. to £3 5s.
Honey	lb.	2d. to 2½d.
Maize	bush.	2s. 2d. to 2s. 4d.
Oats	„	3s to 3s. 8d.
Pollard	ton	£4 17s. 6d.
Potatoes	„	£6 to £9 10s.
Potatoes, Sweet	cwt.	1s. to 1s. 4d.
Pumpkins	„	3s. to 3s. 9d.
Wheat, Milling	bush.	4s.
Onions	ton	£7 10s. to £8
Hams	lb.	1s. 1d. to 1s. 1½d.
Eggs	doz.	7d. to 8d.
Fowls	pair	4s. to 4s. 9d
Geese	„	6s 6d. to 7s. 6d.
Ducks, English	„	4s. to 4s. 6d.
Ducks, Muscovy	„	4s. 6d. to 5s 6d.
Turkeys (Hens)	„	7s. 6d. to 9s.
Turkeys (Gobblers)	„	15s. to 20s.

TOP PRICES, ENOGGERA YARDS, SEPTEMBER, 1910.

Animal.	SEPTEMBER. Prices.
Bullocks	£9 12s. 6d. to £11 2s. 6d.
Cows	£6 15s. to £7 15s.
Merino Wethers	20s. 3d.
Crossbred Wethers	25s. 6d.
Merino Ewes	18s. 9d.
Crossbred Ewes	20s. 9d.
Lambs	16s. 9d.

Farm and Garden Notes for December.

FIELD.—The grain harvest will be now nearing completion, and to all appearance the results are likely to constitute a record, and the yield promises to be very satisfactory to the wheat-growers. The principal factor operating against a still greater extension of the wheat-growing industry is, that many farmers who formerly grew wheat and barley have turned their attention to dairying, which offers larger and quicker returns.

The dry weather which prevailed during parts of the months of August and September gave rise to grave fears for the harvest, but the subsequent timely rainfall came just time to save the crop. The estimates of the probable yield have varied so considerably that it will be well to wait until the harvest is over before calculating on the result.

Given favourable weather, maize, panicum, imphee, Kafir corn, and sorghum may be sown. Arrowroot, ginger, and sweet potatoes may be sown.

KITCHEN GARDEN.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered, otherwise the plants will leave off bearing. Seeds of all these may still be sown for a succession. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Take up onions, and spread them out thinly on the barn floor until the tops wither sufficiently to pull off easily. They should then be graded into sizes, and sent to market or stored in a cool place. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown.

FLOWER GARDEN.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked surface, beneath the loose soil. Alternate light with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulacca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Top-dress all lawns.

Orchard Notes for December.

THE SOUTHERN COAST DISTRICTS.

December is somewhat of an off month for pines, though bananas should be improving both in quality and quantity. The purely tropical summer ripening fruits are not yet ready, and, consequently, there is only a limited supply of fruit in this part of Queensland during the month.

Early ripening varieties of grapes will mature, and care should be taken to market them in good order. The first fruit to ripen should be put up in small packages, as, if marketed in this manner, it will fetch a better price, but as it becomes more plentiful it can be packed in larger cases.

Pay particular attention during the month to all peaches, apples, pears, Japanese plums, or other fruits that are liable to be attacked by fruit fly, and see that no fly-infested fruits are allowed to lie about under the trees, and thus breed out a great crop of flies that will be ready to destroy the grape and mango crops as they mature.

If the month is dry see that the orchard is kept well worked so as to retain moisture in the soil, and, in any case, even should there be a good rainfall, it is necessary to cultivate in order to keep down weed growth, as if weeds are not kept in check now there is little chance of their being kept in hand once the January and February rains set in.

The planting out of pineapples, bananas, and most kinds of tropical fruits can be carried out during the month, especially if there is any rainy weather; but, if the weather is dry, it is better to defer the planting of tropical fruits till January or February.

The cyaniding of citrus trees can be continued when necessary, and where Maroi or orange mite is showing it should be checked at once, as Maori fruit is of no use for the Southern markets, and is unsuitable for export to the old country.

THE TROPICAL FRUIT DISTRICTS.

Clean up all orchards, pineapple, and banana plantations as long as you have the chance of fine weather, so as to have your land in good order when the wet season commences, as once the rain sets in there is little chance of fighting weeds. Watch bananas carefully for fly, and market the fruit in good order. Handle the crop of pines carefully; don't let the fruit get too ripe, as an over-ripe northern pine is tasteless. The fruit should be cut as soon as it is fully grown, as even when quite green the rough-leafed varieties have usually developed sufficient sugar to suit most persons' taste. Pack carefully to prevent bruising, and they will carry South in good order.

Only send high-class mangoes South—bad-flavoured sorts, and stringy, carroty, or turpentine flavoured varieties are not worth shipping. High-class fruit will pay to handle carefully, but there is no demand for rubbish, and I am sorry to say that fully 90 per cent. of the mangoes grown in the State must be classed under the latter heading.

Tropical fruits of all kinds can be set out during suitable weather. Fruit pests of all sorts must be systematically fought.

THE SOUTHERN AND CENTRAL TABLELANDS.

December is a busy month for the growers in the Stanthorpe district. Early apples, plums, peaches, nectarines, &c., will ripen during the month, and must be marketed as soon as ripe, as they do not keep long once they

are gathered. Handle carefully, and grade better; there is far too much early rubbish slumped on to the local markets, which tends to spoil the demand as well as the price. Watch the orchards very carefully for Codling moth and fruit fly, and take every possible precaution to keep these pests in check should they make their appearance, as the future cleanliness of the orchard depends very largely on the care that is taken now to keep these pests in check.

If the month is dry keep the orchard and vineyard well cultivated. Watch the vines carefully so as to detect the first signs of Oidium or Anthracnose, and systematically fight these pests, remembering always that in their case prevention is better than cure, and that only prompt action is of the slightest value.

On the Darling Downs every care must be taken to keep the fruit fly in check, and on no account must infested fruit be allowed to lie about under the trees, as this is far and away the best method of propagating the pest wholesale.

In the Central District the grape crop will ripen during the month. Handle the fruit carefully. Cut it when dry, and where it has to be sent long distances to market pack in 6-lb. baskets rather than in larger cases. Where dry keep the orchard and vineyard well cultivated, and where the citrus and other fruit trees require it give them an irrigation. Don't irrigate grapes once the seeds have been formed, as it tends to deteriorate the quality, and to make the fruit tender and consequently to carry badly.

Agriculture.

POTATO CULTIVATION.

The following paper on potato-growing by an old-time farmer on Pimpama Island has been handed to us for publication. It will show that the pioneer farmers were as much up to date as we are at the present day:—

Land should be ploughed in autumn, thrown up in rough edges exposed to the effect of rain and atmosphere during the winter, and then deeply re-ploughed and worked down to a fine tilth with disc or other harrows, until the seed bed is made as fine and friable as possible. The extent to which the clod-crusher or the roller can be used in these operations is a matter which can only be decided on the spot and at the time. In cloddy ground it is a good rule to be guided as to the application of the roller by the way in which the clods break up when you kick them with the heel of your boot. The roller is doing very little good or may even be doing great harm to the surface of the land as long as it simply forces the clods into the soil and thus produces a level surface. This is why the spiked roller has come into general favour; the clods are not only crushed and levelled, but the soil is again loosened by the spikes, so that the rain and air are admitted, and the heavy rain has less chance of producing a hard crust on the surface. Depth of cultivation, thorough preparation of the land, and a fine mellow seed bed are all important. Wherever the water is found oozing out of the land in winter indicates a patch of land that requires draining. Few people know that a superabundance of water in the winter means the corresponding shortage in the summer. The explanation is that the water-logged land, when it does dry, loses nearly all of its moisture by evaporation. On the other hand, the little particles of a soil, in a friable condition, cling tenaciously to the moisture and remain moist long after the sodden parts of a field have become hard as bricks. Drainage must not be overlooked. Land previously under cultivation should receive a dressing of farmyard manure in the autumn, ploughing it in lightly—say 4 in. deep. It should then be harrowed and left through the winter to mellow the land and start weed seeds. In some cases the manure is applied at planting-time, but in wet seasons this may cause a heavy growth of stalk and a light return of tubers or it may cause a good many hollow potatoes. The second ploughing to the depth of 8 or 9 in. should be given as soon as the land is fit after winter rains, and the land is then worked up with a cultivator to a fine tilth. Land from which a crop of peas has been taken will give a good yield of potatoes without manure in the volcanic soils, and in any system of rotation, as it is well for the potatoes to follow peas, clover, or any leguminous crops. The extra supply of nitrogen which such crops leave behind through the roots and stubble goes to increase the fertility of the land; while the deep-root system, which forms one of their chief characteristics, has a marked effect in rendering the soil friable and mellow, making it comparatively easy to obtain a satisfactory seed bed. There is a good deal of evidence to show that a mealy fine-flavoured potato is largely dependent for its qualities on careful preparation of the land. The selection of seed is important. The selection must be made at the time that the crop is dug, not months afterwards. As each root is dug, the whole of the potatoes it has produced, big and little, are spread out on the surface of the land, and the grower himself selects the necessary quantity for his next crop before they are bagged. Only those tubers are chosen that have produced a fair number of tubers, uniform in size and shape, and without a large percentage of small "pig potatoes." Uniform in character and true to type are the most essential characters. If the farmer will take the trouble, year by year, to select the big seed in this way, he will find the quality of the

potato keeps up and the yield improves so long as the soil and moisture are right. Potatoes intended for seed should never be put together in large heaps or pits, but should be spread out thinly in a cool dry place. If they can be exposed to the sun, all the better; and the greening of the tuber hardens them and renders them less liable to rot. If possible, the seed should be planted before they send out the first shoot, which generally starts from the crown. When this takes place, the other eyes seldom start at all; the result will be only one robust stalk to the plant, which will produce nearly all large potatoes. The cutting of the seed is an important matter. It is a good plan to chip all seed not large enough to cut into two or more sets. This should be done by cutting a thin slice off the stem, and thereby finding out whether the potato is of a bad colour inside, also whether it is affected by the disease known as "Brown Ring," as it is here the first signs manifest themselves. It is a mistake to cut off the "crown," as it is there generally the first and most vigorous shoot starts from. The crop should not be planted too deep, about 5 in. being found the most suitable depth. The "drills" should be from 27 in. to 30 in. apart and from 24 in. to 18 in. between the "sets." The plants when full grown should cover the ground completely, so as to shade it from the sun's rays and conserve all the moisture. The harrows should be put over the ground as soon after planting as possible, and every week or ten days after, until the plants are, say, 3 in. high, to keep down the weeds and to loosen the soil. Then the horse hoe should be put through the drills, care being taken not to mould up the plants. The hoe should never be used after the plants have sent out their roots, as it will destroy them, being near the surface. An important stage of the crop is "blooming time," and particular attention should be paid at this period to plots intended for seed. All plants with "false bloom" should be pulled up at once. This is a work entailing a great deal of time and attention. Once through will not do, as all the plants do not bloom at the same time, and, if neglected, some of the blooms will fail and the plant cannot be identified afterwards. They may be required to be gone through once or twice a week for three weeks or even longer. After a fall of rain is the best time.

REGISTER OF JUDGES AT SHOWS.

We have received from Mr. C. A. Arvier, secretary of the National Agricultural and Industrial Association of Queensland, and hon. secretary of the Queensland Chamber of Agricultural Societies, a most useful publication—issued by the Chamber for the information of Agricultural Societies in Queensland. The reasons for the registration of judges are thus set forth in the pamphlet:—

"Recognising that agricultural shows are intended for the education of exhibitors and visitors, this Chamber has arrived at the conclusion that it is desirable that judges who adjudicate should be fully qualified and competent, thus securing public confidence and a certainty that the awards will be made according to merit, and the intention of societies will be fully attained. The Chamber approves the system of single judging, and believes that it is better to hold one man responsible for his decisions than a number. They also believe in judges being prepared to give reasons for their awards when required. By this means knowledge and education are disseminated, and consequently the shows become truly educational. Thus the reason for compiling the Register of Judges, most of whom have signified their willingness to assist, and explain their reasons for judging when requested by one of the Council of your Association. The services of judges, as a rule, are not fully appreciated. Upon them rest to a very large degree the success of the show; therefore it is most desirable that they should not be put to any pecuniary loss through attending, and, where necessary, a fee should be paid for loss of time from their occupations. If this is done, judges from a distance will be more disposed to travel a journey

for the good of your society and of the public. It is expected that comfortable accommodation is provided for judges.

The register, in addition to the names of suitable judges for all sections of exhibits at shows, also publishes regulations and specimen score-card for jumping events, and conditions for judging trotters, pacers, and stallions in harness, with scales of points, and concludes with the standard of perfection and points of various dairy breeds, for the guidance of judges and breeders, issued by the Queensland Chamber of Agricultural Societies in October last.

COTTON CULTURE IN THE GERMAN COLONIES.

We have much pleasure in acknowledging the receipt of an exhaustive and valuable pamphlet, now in its second revised edition, on the Cultivation of Cotton in the German colonies, by Professor Dr. A. Zimmermann, from the Kolonial-Wirtschaftliches Komitee, Berlin. Although this *brochure* has been written especially for German colonists, yet the information it contains on all aspects of cotton cultivation renders it of great value to cotton-growers of every nationality.

The impetus which has of late years been given to the cotton-growing industry in the German colonies, and the necessity which exists for a practical up-to-date handbook for the colonial planters, induced the committee to publish, in its new revised form, the work compiled by Professor Zimmermann in 1905 on cotton culture in German colonies. This work the author entered upon with the greatest zest, and he embodied in it not only the experience of the German cultivators, but also those of growers and scientists of the older cotton-producing countries. Thus the work is not only a welcome handbook amongst the former, but is appreciated by the growers in all other cotton-growing countries. In the first two chapters the compiler discusses the botanical side of the cotton plant, and describes the most important varieties, whilst the succeeding chapters deal exclusively and exhaustively with the seed, the choice of soil, the laying out and preparation of the field, manuring, irrigation, sowing the seed, the subsequent care of the plants, the crop and how to deal with it when gathered, rotation, subsidiary (intermingled) crops. The closing chapter treats exhaustively of injurious insects and other pests affecting the plant, the bolls, and other parts, such as stem, roots, leaves, flowers, &c. The whole work is profusely illustrated, thus rendering it easy to obtain accurate knowledge of all that pertains to the industry.

A short résumé of the larger work is also published, having special reference to East African conditions, to be distributed to planters in German East Africa through the Kolonial-Wirtschaftliches Komitee, which will be also published for the benefit of native growers in the Suaheli language, and for Togo in the German and Ewe languages.

It is not stated if the work is "copyright" If not, it would be of great value to Queensland cotton-growers if translated into English; since what applies to the industry in East Africa applies equally to the conditions under which cotton is grown in Queensland.

TREATMENT OF SEED WHEAT FOR SMUT.

The director of the Kansas State Agricultural College has issued the following directions for the treatment of seed wheat for smut:—

Wheat is infected by two kinds of smut, known respectively as the "loose smut" and the "stinking smut," or "bunt." In the case of the latter, particularly, the smut may be controlled by the treatment of the seed wheat. The best treatment for the prevention of stinking smut is by what is known as the formaldehyde method, as follows:—Mix 1 lb. (= 1 pint) of commercial 40 per

cent. formaldehyde with 50 gallons of water. *This solution should not be made up until needed for use,* as it loses strength by standing. Spread the seed wheat out on a clean barn or granary floor and sprinkle with the formaldehyde solution, shovelling the grain over and over until each grain is thoroughly moistened. An ordinary garden watering can can be used in sprinkling, but a 3 or 4 gallon hand sprayer, such as is used for spraying fruit trees, is even better. When thoroughly moistened, the grain should be shovelled into a heap and covered with a canvas or tarpaulin for two or three hours. The floor on which the work is done should first be sterilised by washing down with the solution of formaldehyde. The method just described will kill the spores or reproductive bodies of the stinking smut, which fill the swollen, blackened, smutted kernels, and which are scattered over the grain in handling and storage by the breaking up of these kernels in the separator. (NOTE.—Commercial 40 per cent. formaldehyde sells at about 50 cents per lb. (pint) retail, 35 cents per lb. wholesale, and can be obtained at any retail drug store, either directly or by order on a wholesale house.)

The loose smut fungus develops within the kernel, through infection from smutted heads at flowering time, when the spores are blown from plant to plant by the wind. Unlike the stinking smut, the newly-infected kernels do not reveal the presence of the smut within. For the destruction of the loose smut in infected grain, another method is used as follows, known as the Jensen hot water treatment: The seed wheat should be placed, in quantities not to exceed ½-peck each, in loose burlap bags and soaked for 5 or 6 hours in water at a temperature of from 63 to 72 degrees Fahr. For this purpose a 50-gallon coal oil barrel is convenient, the sack of grain being hung from a stick laid across the top of the barrel. Meanwhile water should be heated in quantity sufficient to fill two additional barrels with from 20 to 40 gallons of hot water, according to the quantity of seed to be treated. The water for these two barrels should be gotten to a temperature of 129 degrees Fahr. This may be done in one of two ways—First, by heating the water several degrees above this point, pouring it into the barrels, and then testing from time to time by means of a good thermometer hung deep in the water, until it registers 129 degrees. When the water in the two barrels is at the required temperature, the sack of soaked grain from the cold water barrel is immersed for one minute in one of the hot-water barrels (which should be marked No. 1) to bring the temperature of the grain up to the required temperature. The sack should then be transferred to the other hot-water barrel (marked No. 2), where it is allowed to remain for 10 minutes, the sack and water being agitated during the entire time, and the thermometer being carefully watched throughout the operation to see that the temperature of the water is not below 124 or above 131 degrees. If the temperature falls, more hot water must be added, or the time of immersion somewhat lengthened. If the temperature is above 129 degrees, the time of immersion must be somewhat shortened. At no time must the temperature exceed 131 degrees. Seed wheat treated as above should then be dried by spreading out on a clean floor and shovelling over repeatedly until it is dry enough to run freely through the drill. A second and better method of managing the hot water is to keep two tanks, boilers, or galvanised iron tubs of sufficient capacity to hold the sack of grain well submerged, constantly at a temperature of 129 degrees over a stove or a gasoline burner, the latter being preferable because it is easier to regulate the heat. Care must be taken not to get the temperature too high in the bottom of the tank, next the fire. A preliminary trial with a thermometer hung constantly at a depth at which the bag of seed is to hang will enable one to gauge the strength of flame necessary. The greatest advantage of this method of managing the hot water lies in the fact that a larger amount of seed grain can be treated in the same length of time, since a continuous flame enables the operator to keep the water more continuously at the required temperature than by the barrel method, and with

less handling of water. The planting of about one-fourth more seed is advisable, to replace any seeds of low vitality which have been injured in the treatment.

A combined treatment for both loose smut and bunt may be given by maintaining the temperature of barrel No. 1 at 120 to 125 degrees and No. 2 at 132 degrees Fahr. As before, the immersion in No. 1 should be for one minute and in No. 2 ten minutes. This method has a certain disadvantage in that the temperature of 132 degrees kills a considerable quantity of grain, which must be made up for by planting from one-fourth to one-half more seed than is ordinarily sown.

Smutted grain of both sorts can easily be recognised in the field. The heads of the plants infected with loose smut are entirely destroyed, and the black powdery dust (the spores or reproductive bodies) is blown about by the wind at flowering time and infects the new seeds just forming in the heads. The fungus then develops *inside* these grains and remains invisible, causing no change in the form or appearance of the berry. Such infected seeds may thus go out into the field again. The fungus inside the seeds grows up inside the young seedling and makes itself visible at flowering time as before, when it forms a blackened head full of dusty spores which escape and blow away over the field.

The stinking smut changes the form of the kernel, causing it to become black and hard and abnormally large. Within these blackened kernels the wheat substance is entirely consumed by the fungus, which fills the space full of the powdery black spores. As the kernels do not break open, however, the spores do not escape into the field except where the smutted grains are accidentally broken off and trampled into the soil and crushed. When such smutted grains go through the separator, however, many of them are broken to pieces, and the spores within are scattered over the unsmutted grain, adhering in the crease, on the brush, &c.

The stinking smut is ordinarily the more prevalent of the two. Where the loose smut is abundant, change of land for a season is desirable. This will allow the smut spores that become scattered over the soil by the wind to germinate and die. If wheat is planted on land badly infected with loose smut, there is danger of the smut spores on the ground germinating and sending their germ tubes into the wheat when it germinates.

SOYA BEANS.

Within the last couple of years growing interest has been taken in the cultivation of the Soya bean. It would appear from the enormous quantities of yellow beans of this variety imported into Europe from Manchuria that there is a practically unlimited market for this product, which has been proved to thrive well in Queensland. We receive so many inquiries concerning Soya beans from all parts of the State that we hail with great pleasure the publication of an exhaustive treatise on the subject by Mr. C. E. Liardet, China. In the interests of our farmers, we have taken the liberty of publishing in the Journal the most essential portions of the treatise, as well as of reproducing the photographs of the plant at various stages of growth:—

Climatic and Soil Requirements of Soya Beans.

The Soya bean is especially adapted to the cotton belt and corn belt. The early varieties mature in part of the corn belt, but frequently do not make a sufficient yield to warrant growing them. Generally speaking, the Soya bean requires about the same temperature as corn. It is, perhaps, even better adapted to a warm climate and does not do well in a very cool climate. The soil requirements of Soya beans are much the same as those of corn. They will make a satisfactory growth on poorer soil than corn, provided inoculation

is present, but will not make nearly as good a growth on poor soil as cowpeas. Soya beans make their best development on fairly fertile loams or clays. The (yellow) Soya bean also succeeds well on sandy soils. On rich soils all varieties are apt to make a large plant growth and a comparatively small yield of seed, and on the poorer soils a small plant growth with a relatively large seed yield.

Soya beans do not require a well-drained soil for their best development, although they will not grow in a soil where water stands for any considerable length of time. However, they are able to withstand a greater amount of moisture than either corn or cowpeas. On this account Soya beans are especially valuable for growing in that region, and on the vegetable mould soils they make excellent crops where heavy rainfall is the main drawback.

Soya beans are also decidedly drought resistant, much more so than cowpeas. Rabbits are exceedingly fond of the foliage, and where they are numerous it is nearly useless to plant Soya beans unless the field can be enclosed with rabbit-proof fencing.

Varieties of Soya Beans.

At the present time there are several varieties of Soya beans—viz., yellow, greenish yellow, black, brown, green, and white. (See Fig. 2.) The yellow is the largest growing and latest of the Soya beans at present handled by seedsmen and seed-crushers. It is rich in oil (17 and 18 per cent.), albuminoids, carbohydrates, and nitrogen. Under average conditions it will grow from 3 to 5 ft. high, depending principally on the character of the soil. (See Fig. 1.) Ordinarily it requires from 120 to 150 days to mature a crop of seed. The yellow bean yields well in both grain and roughage, and is satisfactory for both. It is a most exacting variety about depth of planting, and under no circumstances should the seed be planted more than 2 in. deep. The habit of growth is such that it can readily be harvested with machinery, and it is frequently gathered with a grain binder.

The Greenish Yellow.

It is very vigorous, though not coarse, medium-late variety, growing 3 to 4 ft. high, with numerous branches, but none close to the ground. It can be easily harvested with machinery, and is an excellent seed-producer.

The Black.

This Soya bean requires a very long season in which to make its full development, and is, therefore, adapted only to the cotton belt. The seed is rather small, long, and flat and covered with a powdery bloom which makes it look dusty. The plants grow from 4 to 6 ft. high, but have fine stems, and consequently are a very desirable type for hay.

It contains about 16·80 per cent. of oil (*vide* analysis), 47·80 per cent. of albuminoids, and 7·66 per cent. of nitrogen.

After all the oil has been extracted, the residue is used in large quantities as food by the Chinese and Japanese, who make a favourite condiment called "Shoya," soy sauce, which is a darkest-brown colour and is largely exported to Europe for sauce-making purposes.

The Brown.

This variety is excellent for hay, as it is tall and has fine stems and branches. It gives a large yield of seed, and its tall habit makes it easy to mow, but unfortunately it is somewhat inclined to lodge. It matures in 110 days. The seeds are large, and break rather easily in threshing.

The Green.

It grows very extensively in North China, and is considered by the Chinese one of their very best eating beans, and contains about 17·1 per cent. of oil (*vide* analysis), kidney shaped, green throughout, and much larger in

Plate XX.

FIG. 1 Typical Soya Bean Plant showing pods and nodules.

Plate XXI.

FIG. 2.—A plant of the large "Yellow" variety of the Soya Bean, showing its characteristic habit of growth. Height, 40 inches.

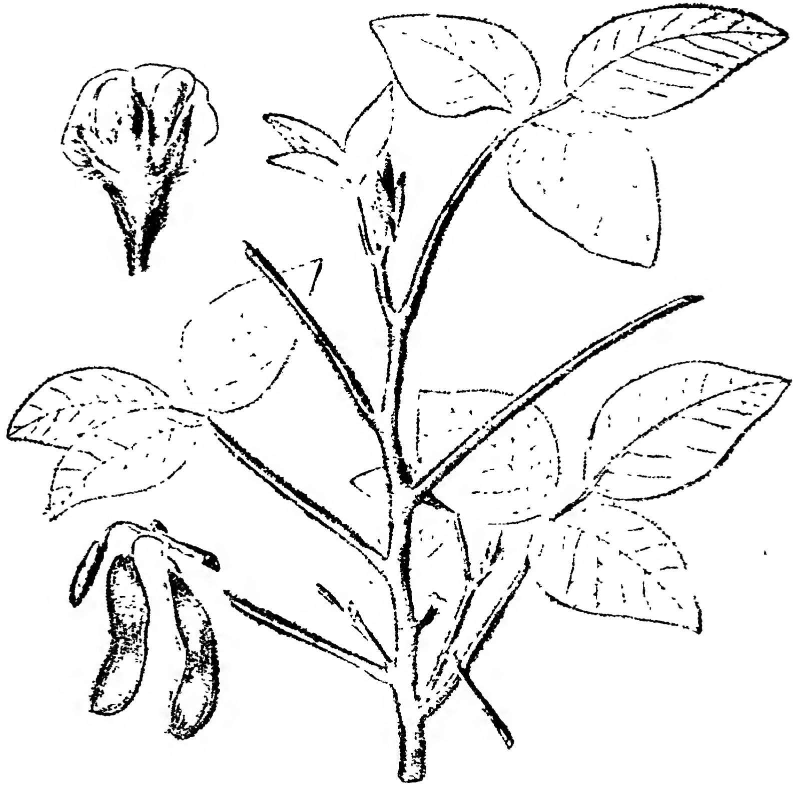

FIG. 3.—Soya Bean, showing flowering branch, flower, leaves, and pods. It is an erect annual plant with branching hairy stems; trifoliate, more or less hairy; leaves rather inconspicuous; pale lilac or violet coloured flowers, and broad with five-seeded pods covered, like the stem, with stiff, reddish hairs.

size than any of the other varieties. It grows about 3 ft. high, and matures in about 90 days. The leaves drop without changing colour when the plant ripens. The plant is very coarse and not satisfactory for hay. On these accounts it is not a desirable variety, only for the oil.

The White.

This variety grows abundantly in China, and Darjeeling, Himalaya Mountains, Bengal, India, and is known in India as (Glycine Soja-Bhát). It is one of the staple foods of both countries, and contains about 16·60 per cent. of oil, 21·87 per cent. of albuminoids, and 3·50 per cent. of nitrogen (*vide* analysis).

The Culture and Planting of Soya Beans.

Good preparation of soil is necessary for Soya beans; otherwise weeds are likely to choke the young plants. This preparation should consist of deep ploughing and subsequent working with the disc and harrow until a firm seed bed, with the upper 2 or 3 in. loose and mellow, is secured. Under nearly all conditions the crop should be grown in rows and given sufficient cultivation to keep down weeds. If the ground is exceptionally free from weeds, Soya beans may be sown broadcast or drilled with the idea of using them for hay. The yield of seed is nearly always greater when grown in cultivated rows.

Soya beans, if in rows should be planted so as to have a plant on an average of every 2 or 3 in. in the row and the rows from 30 to 36 in. apart. Cultivation can be more easily accomplished if the rows are 36 in. apart than where the distance is less, though the plants have room for development in 28-inch rows.

It is especially important to plant seed of good quality. Soya bean seed, unless it is fresh and has been properly stored, is very apt to be low in germination. It should, therefore, be tested for viability, before planting time. The planting should be shallow, preferably 1 in. and not to exceed 2 in. in depth. Poor stands result more frequently from too deep planting than from any other cause. A bushel of good seed is sufficient to plant from 2 to 3 acres if in cultivated rows, and hardly enough for 1 acre if sown broadcast.

The cultivation of Soya beans is a very simple matter. Unless conditions are very unfavourable, the seedling plants appear above ground in a week, and tillage may then begin. Any good cultivator may be used, and flat cultivation is preferable, as the harvesting can be more easily done than if the rows are hilled or ridged. Soya beans may be planted through a wide period from early spring till midsummer. Ordinarily they are planted about 1st June. In general, early plantings require more time to mature than late plantings, the difference in the same variety often amounting to as much as 3 weeks.

The Inoculation of Soya Beans.

Like other legumes, Soya beans are able to utilise the nitrogen of the air and add it to the soil by means of root nodules. These nodules are caused by certain bacteria; unless they are present, Soya beans in the usual types of soil will make but a weak growth, and many of the plants will turn yellow and die. In isolated localities where this crop has not been grown, however, some difficulty may be expected from lack of inoculation during the first season at least. Inoculation of a new field may be secured either by the soil-transfer method or by the use of the pure cultures. The soil-transfer method consists in scattering soil from an old, well inoculated Soya-bean field over the new ground at the rate of 200 to 300 lb. per acre. To facilitate even scattering, this should be thoroughly mixed with several times its weight of ordinary soil. The soil may be either drilled or broadcasted. In the latter case it should be done toward evening or on a cloudy day, as bright sunshine is very harmful to the germs. The objections to the soil-transfer method are the labour and cost involved and the serious liability of spreading weeds and dangerous plant

diseases. Successful inoculation by this method is, however, practically certain.

The advantages of the artificial cultures lie in the greater ease of transportation and application, as well as in the absence of the danger of introducing plant diseases or harmful weeds. This method is frequently unsuccessful with Soya beans, due possibly to the oily nature of the seeds.

When growing Soya beans or any of the legumes for the first time, it is an excellent plan to plant a small experimental plot, inoculating thoroughly by the pure-culture method. If this plot is successful, an abundance of soil will be available for inoculating large fields without danger of introducing weeds or diseases.

Soya Beans for Hay.

Soya-bean hay, when cut at the proper stage and growth and carefully cured, is excellent, and for dairy cattle at least yields results equal to Alfalfa hay. For hay production Soya beans may be planted in cultivated rows, or when the ground is free from weeds they may be drilled or broadcasted. The late or medium-late varieties are, as a general thing, best adapted for hay production These varieties grow to a greater height and have finer stems, branches, and more leaves than do the earlier sorts. Of the varieties now handled by seedsmen, the best for hay production are the large "yellow" and the medium-sized "yellow." The large "yellow" variety makes a very large growth plant, and usually produces a large quantity of seed. The medium-sized "yellow" is smaller, with finer stems, and also yields satisfactory crops of grain. It is at least a month earlier than the large "yellow." To get the best hay from Soya beans they should be cut when half or more of the pods are fully grown, but before they begin to change colour in ripening. Another rule, which is probably the better one to follow, is to cut when the top leaves begin to turn yellow. This is the best guide in most cases, but does not always apply, as some varieties shed their leaves without change of colour. At this stage of growth the largest yield and at the same time a good quality of hay will be secured. If the cutting is done earlier than this, the percentage of protein will be higher and there will be practically no waste in feeding; but the total yield will not be so large and the difficulty of curing much greater. If the cutting is much later than this, the total food constituents will be greater, but there will also be considerable waste of material in feeding due to the stems becoming hard and woody.

Curing the Hay.

The planting should be timed so that the crop can be cut for hay in September, as this month is usually the most satisfactory for hay-making. The cutting may begin as soon as the dew is off the plants and continue for the rest of the day. The plants should be allowed to lie in the swath until the leaves are well wilted, but great care should be exercised to rake them before the leaves become dry and brittle. After raking into windrows, they should be left for a day or two, depending on the weather and then put in small cocks or bunches. Three to five or six days of good weather is ample time for making good Soya-bean hay. Great care should be used to prevent the loss of leaves, since these are the most valuable part of the plant except the pods.

When the hay is dry, it should be put in good-sized stacks or under a shed. If it is stacked in the open field it is very essential that some other material, either grass or a canvas cover, be put over the stack, as Soya-bean hay does not shed rain well. Yields from 1 to 3 and occasionally 4 tons of cured hay to the acre are secured. The average yield is about 2 tons per acre.

Curing-frames can often be used to good advantage in making Soya-bean hay, especially in unfavourable weather. The object of these frames is to keep the cocks open, so as to prevent matting and to allow circulation of air.

In stocking the hay, poles or logs placed in the centre of stack, so as to leave passages for air, will greatly lessen the danger of spoiling.

Plate XXII.

FIG. 3.—Soya Bean plant in full bearing, with about 40 pods.

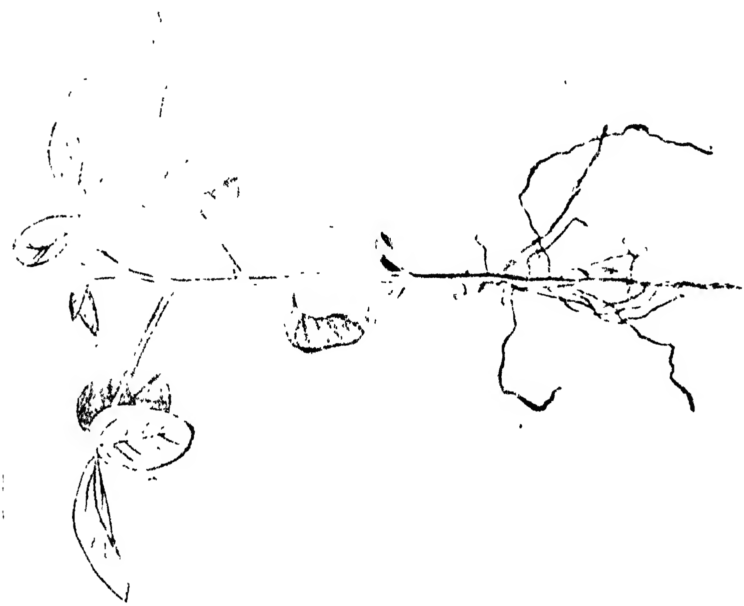

FIG. 4.—A young seedling Soya Bean.

Soya Beans for Pasturage.

The Soya-bean crop can often be profitably utilised by pasturing, particularly to hogs, especially when fed corn in addition. This is advisable when harvesting is interfered with by lack of labour, bad weather, or other causes, and when the crop is grown especially for soil improvement. By this means not only is the crop profitable in itself, but the manure is returned to the soil. The usual practice is to turn the hogs into the Soya beans when the pods are nearly full of grain, but before they have begun to ripen. In pasturage experiments, the following crops as pasturage for hogs were compared:—

Soya beans, peanuts, chufas, and sorghum. In these experiments it was found that, when corn alone was fed, 100 lb. of pork cost 7·63 dollars. When fed on two-thirds ration of corn and pastured in addition, 100 lb. of pork cost 8·89 dollars; when on chufa pasture, 7·79 dollars; on sorghum pasture, 3·20 dollars; on peanut pasture, and 2·74 dollars on Soya bean pasture. The average gain of the pigs each day on the Soya-bean pasture was 1·02 lb., on the peanut pasture 1·01 lb., on the chufa pasture 0·72 lb., and on the sorghum pasture 0·37 lb. In this experiment the hogs were turned into the Soya beans while the pods were very small; so that for two weeks they ate only the leaves and young shoots. In a similar experiment conducted, the effect of the legume crop grazed by hogs was determined on the two succeeding cotton crops as compared with cotton following corn not grazed. The figures show that the two cotton crops aggregated 2,905 lb., of seed cotton following peanuts grazed 2,608 lb., following Soya beans grazed, and only 1,802 lb. following corn not grazed.

Soya Beans in Mixtures.

There has been but little experimenting as yet in growing Soya beans in mixtures with other plants. What little has been done indicates that the Soya bean may be satisfactorily grown in combination with a number of other agricultural crops.

Soya Beans and Cowpeas.

Soya beans and cowpeas make a very satisfactory mixture for hay purposes. The tall, strong-growing varieties of Soya beans are to be preferred for this combination, as the cowpeas are vining plants and need something to hold them up, so that they can be readily harvested. The hay of such a mixture is more desirable than the hay of either crop alone, as it affords variety. The yield also is nearly always greater. There is no doubt that most live stock prefer the Soya beans to the cowpeas in this mixed hay, but both plants are eagerly eaten by practically all kinds of farm stock. In sowing Soya beans and cowpeas in mixture about 1 bushel of the former to ½-bushel of the latter per acre should be used. If planted in rows, about one-half of this quantity of each is sufficient. It is necessary to have more Soya-bean plants than cowpeas, so that the vining growth of the cowpeas may be supported properly. The large "yellow" and medium "yellow" varieties of Soya beans are preferable.

There has been considerable difficulty experienced in getting a stand of the Soya beans when grown in mixture with cowpeas. This is mainly due to putting the seed in the ground too deeply, a point which should be kept constantly in mind in planting Soya beans. The planting can be done best with an ordinary grain drill, whether it is to be in cultivated rows or sowed.

The curing of a mixture of cowpea and Soya-bean hay is more easily accomplished than the curing of cowpeas alone, and slightly more difficult than in the case of Soya beans alone. The time to cut will necessarily depend on the relative stage of growth of the two crops. As nearly as possible, both plants should be at the best stage of growth for hay-making when the harvesting is done. This time is when about half of the Soya-bean pods are

fully grown and just beginning to ripen and the first pods of the cowpeas are ripe. At this stage of growth they will make a hay the quality of which is hardly surpassed by any other produced on the farm.

Soya Beans and Sweet Sorghum.

The Soya bean may be grown in mixture with sweet sorghum. There is some objection to the mixture when broadcasted, as the sorghum is apt to choke out the Soya beans. When grown together in cultivated rows, this objection is largely overcome. Amber sweet sorghum is usually the best variety to grow.

Soya Beans and Corn.

Soya beans are more commonly grown with corn than with any other crop. They are planted in different sections in various ways—namely, in alternate hills with the corn in the same row, in alternate rows of each, in alternate series of two rows of each, or broadcasted in mixture. Such fields when planted in rows may be harvested for silage, or where the rows alternate the two crops may be harvested separately. Sometimes such mixed fields are utilised by pasturing for hogs. The large "yellow" and medium "yellow" varieties of Soya beans may be planted in between the corn rows at the time of the last cultivation.

Soya Beans and Ensilage.

The growing of Soya beans for ensilage has not been practised very extensively. In a number of instances ensilage has been made of the crop, usually in combination with corn, and it is invariably reported as making an excellent succulent feed. Only the larger late-growing Soya beans are desirable for this purpose. Some have tried growing Soya beans in the corn rows or between the corn rows, planting them the same as cowpeas are planted in the corn fields; while others prefer growing corn and Soya beans in separate fields, and when the ensilage is put up to mix them in the cutting. Where the soil and climate will permit, it would seem to be more satisfactory to grow the Soya beans in the corn field. It is doubtful whether it will be economical to make ensilage of Soya beans when hay can be made with comparative ease. Corn deteriorates so much more rapidly in the shock than do most of the crops which can be made into hay that if ensilage is to be made on the farm the more economical practice will likely be to use the corn crop for this purpose and save the other crops for hay.

Soya Beans for Grain.

Growing Soya beans for the grain for use as feed is distinctly profitable if the yield is 16 bushels or more per acre. The feeding value of the grain is very high, being superior to cotton-seed meal. The grain is rich in protein, while nearly all the other grains produced on the farm are poor in protein, but rich in carbohydrates.

For grain production tall varieties that do not branch or bear pods close to the ground are desirable, as they are more easily harvested. Of the varieties now on the market, the large "yellow" and medium "yellow" are undoubtedly much the best for Southern districts, while the medium "yellow" and "green" are best for more Northerly latitudes. A very serious objection to the "green," however, is its tendency to shatter seeds at ripening time, which is remediable.

When grown for grain alone, the cutting may be delayed in the case of most of the varieties until all of the leaves have fallen. The "green" and a few other varieties not at present on the market retain the leaves late, and much seed would be lost by shattering if the harvesting were not done earlier. The plants should be allowed to become thoroughly dry after cutting

before they are stacked or put into a barn or shed. Care should be taken, however, not to let them get too dry before they are piled into bunches, as there is likely to be considerable shattering of seed in such cases, especially if rained upon. Thrashing is most satisfactorily done in the field without previous stacking, if conditions will permit. It is hardly possible under most conditions to harvest the crop without getting a certain quantity of soil mixed with it, and if the thrashing is done outside the resulting dust is not nearly as troublesome as when done inside. The fine hairs on the stems and pods also make a disagreeable dust in thrashing.

Harvesting may also be done when the leaves first begin to fall, getting in this way practically as much seed as when the plants are allowed to mature, and besides saving all the leaves. Such straw is much more valuable as feed than the stems alone, though stock will eat both readily. One field produced in this way 25·5 bushels of grain and nearly 2 tons of straw to the acre. The large "yellow" variety in a number of tests averaged nearly 20 bushels per acre and 1½ tons of straw when grown in acre plots.

One of the principal drawbacks which will be overcome in growing Soya beans for seed has been the harvesting. The small early varieties can be harvested only with a mowing machine or a bean harvester, or by hand. The bean harvester has not given very satisfactory results. The mowing machine is apt to cut many of the lower pods in two, and even leave some of them on the stubble. Hand work is too laborious and expensive. Many of the later and more erect-growing varieties can be satisfactorily harvested with a mowing machine or a drop-rake reaper, and the taller varieties even with a self-binder.

The self-binder is the most satisfactory machine to use with tall varieties. With lower varieties the drop-rake reaper is recommended. This machine will leave the crop in small bunches which can easily be gathered. As the drop-rake reaper will cut as low as a mowing machine, it is preferable to a mower. It can also be used very satisfactorily for harvesting cowpeas. On a small farm the drop-rake reaper is, perhaps, too expensive to justify purchasing, but here the mower with a side-delivery attachment can be made to answer the purpose.

[TO BE CONTINUED.]

FIBRE FROM NETTLES.

Those who have sunk so much money over the cultivation and decortication of Ramie, which is also of the Nettle family, will be interested to learn from H.M. Consul at Moscow (Mr. H. M. Grove) that a large manufacturer of cotton goods in that district has succeeded in obtaining from the ordinary nettle a fibre which may act as a substitute for flax.

The method of preparing the nettle is very simple. The nettle is mown and dried, it is passed twice through a machine with smooth and fluted rollers to flatten the stalks and separate the useless vegetable matter, after whic hthe fibre is ready. The fibre is greenish, very like hemp fibre, but only half the weight of hemp; 40 lb. of dried nettle gives 10 to 12 lb. of fibre, which can replace flax or hemp, and can be stripped, combed, &c., for spinning. The yarn obtained is fine and of very good quality, and dyes and bleaches excellently.—" Tropical Life."

[That the common European nettle contains a large quantity of fibre has long been known, but no serious attempt has until now been made to utilise it.—Ed. " Q.A.J."]

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF OCTOBER, 1910.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Average Test Per cent.	Commercial Butter.	Remarks.
			Lb.		Lb.	
College Lass	Ayrshire	22 Aug., 1910	1,366	4·1	62·66	
Mona	Grade Holstein	14 Aug. ,,	1,174	3·9	51·08	
Auntie	Ayrshire	8 Aug. ,,	1,085	4·2	51·04	
Glen	Shorthorn	21 July ,,	831	4·5	42·03	
Honeycomb	,,	25 June ,,	920	4·0	41·12	
Nancy	,,	10 Aug. ,,	944	3·8	39·96	
Lubra	Grade Jersey	17 Mar. ,,	624	5·0	35·22	
Peewee	Grade Holstein	22 Aug. ,,	777	4·0	34·72	
Butter	Shorthorn	14 Aug. ,,	752	4·0	33·60	
Remit	Holstein	8 July ,,	785	3·8	33·23	
Daisy	,,	29 Dec., 1909	778	3·6	31·12	
Cocoa	Jersey	12 Sept., 1910	614	4·4	30·32	
Tiny	,,	30 July ,,	603	4·4	29·78	
Lemonade	Grade Guernsey	25 May ,,	565	4·6	29·23	First calf
Cuckoo	Jersey	8 July ,,	637	4·1	29·21	
Ethel	Grade Holstein	9 Oct. ,,	662	3·9	28·80	
Eve	Jersey	1 Nov. ,,	610	4·2	28·70	
Lydia	Ayrshire	8 Sept. ,,	669	3·7	27·54	
Nita	Grade Shorthorn	24 July, 1910	596	4·1	27·33	
Norma	Shorthorn	15 July ,,	655	3·7	26·95	First calf
Carrie	Jersey	26 Feb. ,,	555	4·3	26·76	
Ivy	,,	4 June ,,	592	4·0	26·45	
Md. Calve	Grade Shorthorn	4 June ,,	641	3·7	26·38	First calf
Gem	Shorthorn	22 Jan. ,,	576	3·9	25·06	
Orange	Grade Guernsey	13 Dec., 1909	438	5·0	24·72	
Lady Sue	Grade Holstein	4 April, 1910	599	3·7	24·55	First calf
Rusty	Shorthorn	19 Aug. ,,	580	3·8	24·55	First calf
Hettie	Grade Guernsey	15 Oct. ,,	537	3·9	23·36	
Lerida	Ayrshire	26 Jan. ,,	506	4·1	23·51	

From 1st to 15th d pastured on lucerne for two hours daily.
From 16th to 31st natural grass only.

ANNUAL COST OF KEEPING A COW.

A very detailed and interesting estimate of a dairy cow's keep has been prepared by Mr. W. M. Singleton, Assistant Director of the Dairy Produce Division of the New Zealand Department of Agriculture, and published in the October number of the Journal of that Department. How far the estimate of cost will apply to Queensland conditions is a matter for dairy farmers in this State to determine; but, as a whole, it is probably as near for Queensland as for New Zealand. Mr. Singleton says:—

The annual cost of keeping a cow is a vital question to every dairy farmer, and is a subject which the yield-testing of dairy cows causes the owner to consider more carefully. Believing that this subject may be treated more minutely than has yet been done to my knowledge in New Zealand, the following itemised estimate of the annual cost of keeping a cow has been prepared:—

ANNUAL COST OF KEEPING A DAIRY COW.

(*a*.) Labour: One man, 20 cows; salary, £2, including board; ten-months period, £86 for 20 cows. For one cow, £4 6s.

(*b.*) Interest on shed worth £5 per bail; one bail suffices three cows; interest, 6s. One cow, 2s. Taxes per cow, 2½ acres at 2s. 9d., 7s. Depreciation, repairs to shed and yard, per cow, 2s. Total, 11s.

(*c.*) Service fee: Interest on bull worth £30 at 6 per cent., £1 16s.; depreciation on bull, £4; grass (£75 worth land at 6 per cent.), £4 10s.; extra winter feed, 16s.; taxes on bull paddock, 7s.; total, £11 9s. Less manure, £2 10s. Net for 30 cows, £8 19s.; per cow, 6s.

(*d.*) Interest and depreciation on cow, value £9: Interest at 6 per cent., 10s. 10d.; depreciation, 10s. per cow, £1 0s. 10d.

(*e.*) Interest and depreciation on tinware, 1s.

(*f.*) Feed: Interest on £75 invested in land at 6 per cent., £4 10s.; extra winter feed, 15s.

(*g.*) Interest on cart valued at £21, horse £20, harness £9—total, £50, at 6 per cent. per annum, £3; depreciation, repairs on cart, £2; depreciation, repairs on harness, £1 10s.; depreciation on horse, £2; horse-shoeing, £2. Total for 30 cows, £10 10s.; for one cow, 7s.

(*h.*) Loss in herd by deaths, averaging 7 per cent., 12s. 6d.

(*i.*) Artificial fertiliser to maintain pasture, 5s.

(*j.*) Depreciation of fences, 5s.; total, £12 18s. 6d.

CREDITS.

Cheese cow: Whey, £1; calf, 6s.; manure, £2 10s.; total, £3 16s. Butter cow: Skim-milk, £2; calf, 6s.; manure, £2 10s.; total, £4 16s.

Before cows start producing profit as dairy cows on this basis: Cow supplying cheese factory must produce £12 18s. 6d., less £3 16s., or £9 2s. 6d.; cow supplying butter factory must produce £12 18s. 6d., less £4 16s., or £8 2s. 6d.; or, say, £9 and £8 respectively.

This is to be considered as a guide only. The dairy farmer must be a law unto himself, and figures such as these can merely be made approximate. Local rates very in different districts. Depreciation varies according to treatment. The table submitted is, therefore, intended merely as an example, while the figures contained therein will be found fairly closely to approximate an average.

With regard to labour, one man is supposed to do the work of milking, carting milk, washing cans, &c , for 20 cows. His salary is taken at £1 5s. per week, with 15s. for cost of board, totalling £2. His engagement for ten months would cover a full milking period. During the earlier and latter portions of that period his duties would be less, and he would be available for other work part of the time. This has been taken as being counterbalanced by the duties during the remaining two months of the year, when the cows get but little attention. It is recognised that on some farms the cost of labour will be somewhat greater than this estimate. On other farms, the milking period is shorter and the cost less. This is submitted as an average.

In item (*b.*) interest is figured on a shed costing £5 per bail, at 6 per cent. This would only be a lean-to milking-shed, and one bail suffices for three cows. If a bail is made for each cow in order to provide for feeding, this item should be increased by at least 4s. The taxes are figured on the basis that 2½ acres support one cow, and that on this land the dairy farmer's payments for rates and taxes average 2s. 9d. per acre. Local rates necessitate small variations, but the total variations is not a large sum per cow. The repairs and depreciation on the shed are estimated at 2s. per cow; with the larger shed referred to above, 6s. would be about right.

In item (*c.*) it is assumed that every dairyman should own a purebred bull of a good milking strain. A fairly large depreciation is allowed, seeing that a bull may be used only some three years in the one herd. For grass

he has been charged the interest at 6 per cent. on £75 invested in land. Sixteen shillings has been allowed for extra winter feed. Even with fairly heavy depreciation, the services of a purebred bull in a herd of 30 cows is not a costly item per cow, and no farmer rearing his heifer calves should be without one. The item has been reckoned on a herd of 30 cows, because that is the size of the average herd of the association.

Item (*d.*) explains itself very largely. Dairy herds have been sold this year at prices ranging from £6 to £11, and £9 has been taken as an average. According to the ages of the cows in the Cow-testing Association, a cow may not be counted on for more than six or seven years' service. Many are then sold for beef, for, say, £6. A depreciation of 10s. per year will not more than cover loss in such instances. With good cows, kept to an age of twelve years or more, heavier depreciation should be allowed. This item does not cover the percentage of cows lost by death.

Item (*e.*) explains itself.

The explanation of item (*f.*) is contained in that of item (*c.*). The amount of land necessary for 30 cows is assumed to also feed the milk horse.

Item (*g.*) estimates the value of a cart to take the milk of a 30-cow herd to the factory at £21, the horse £20, and the harness £9. The cows are charged with interest on this expenditure, totalling £50, at 6 per cent. per annum. The upkeep of the cart (depreciation, new tyres, and painting periodically, together with minor repairs) is taken at £2, and the depreciation and repairs of the harness at £1 10s. per annum. The depreciation on the horse is £2, and horseshoeing is estimated at £2. This makes a total charge of £10 10s., against 30 cows, or 7s. each.

In item (*h.*) it is estimated that the loss by death in a 30-cow herd may be two cows per year. This at £9 per head means £18, which when spread over the whole herd equals 12s. per cow. Two cows in 30 represents almost 7 per cent. This percentage will vary on different farms, and during different seasons on the same farm.

Item (*i.*): The dairy farmer who is on land which is not virgin soil finds that he must now include in the cost of the annual keep per cow an amount which will, when invested in artificial fertilisers, maintain the carrying capacity of his farm. A modest amount of 2 cwt. of fertiliser per acre every fourth year, taking 2½ acres per cow, and fertiliser worth £4 per ton, nets a cost of 5s. per cow per year. This is about the smallest quantity used, and some districts and soils require considerably more.

Item (*j.*): The depreciation of and repairs to fences is another item which, although unnoticed for a time, should be charged annually. This would over a prolonged period of years average about 5s. per cow.

The cost of such improvements as drainage, &c., is not included, since this should be added to the capital value of the land, and the owner is recompensed through increasing the carrying-capacity of his farm.

Against these charges a cow must be credited with the value of her milk, the by-products (whey or skim-milk) from it, the calf and the manure. The value of the last three items is estimated, leaving the farmer to determine the value of the milk by the price his factory pays for butter fat. The amount realised for by-products per cow has been estimated at £1 per cow for whey, and £2 for skim-milk. Authorities are almost unanimous in stating that skim-milk has double the feeding-value of whey. These figures are taken as indicating average work. Many dairymen make more, and there are those who net less. The calf has been valued at an average of 6s.; some of the calves, being from the better cows in a grade herd, and sired by a purebred bull, would be worth more, others less. The manure from the cow for the year is estimated at a value of £2 10s. The cow during this period should drop at least 10 tons of manure. The value of this has been figured at 5s. per ton.

If the manure be worth putting in the farm, we must credit the cow with this much, since this is merely paying the cow for putting it on the land. Practical farmers find that to spread artificial fertiliser costs this much. The bull has been credited with a like amount. It is recognised that with mixed farming, cow manure can be used so as to return a greater value. In ordinary grazing, however, much of the value is lost through evaporation and the effects of uneven application.

It is, of course, apparent that a cow producing sufficient butter-fat to pay her way according to this table, is providing her owner with a means of paying interest on his investment in his farm. She must, however, produce milk to a value beyond these amounts before dairying will in itself be a paying industry. To get merely interest on his investment and wages does not warrant any farmer undertaking such risks as endeavouring to run a dairy farm with cows which will not produce milk to a greater value than will satisfy such demands. True profit in dairying can be figured as merely the value of those cow-products—namely, milk, whey, of skim-milk, calf, and manure—which are produced over and above what is necessary to satisfy legitimate charges made against the cows.

BRIE, PONT L'EVEQUE AND OTHER SOFT CHEESE.*

Brie.

The Brie cheese is a very popular variety in France. It is softer and more creamy in texture than the Camembert, resembling a good cream cheese, but necessarily of different flavour.

It is larger than the Camembert, but the ripening process is similar, and it owes its distinctive flavour and qualities to the action of moulds which grow upon its surface. In the matter of curing-rooms and method of manufacture, the requirements are very similar to those of the Camembert, though the temperatures at which the various rooms are kept vary somewhat.

The aim of the maker is to obtain a cheese which will ripen rapidly and regularly. The first point is chiefly a matter of manipulation, while the second depends upon the growth and development of certain types of moulds and ferments. In order that a cheese may ripen quickly, it must contain an excess of moisture and be non-coherent; to ensure this condition a slow coagulation of the milk is necessary, and this means the employment of a very small quantity of rennet and the use of sweet milk.

The milk is usually brought direct from the cowsheds while retaining its animal heat, and the rennet is added at a temperature of from 82 degrees to 86 degrees Fahr. About 14 lb. of milk are required to produce a cheese of standard size, and coagulation should be complete in about four hours.

When the curd is ready to be ladled out, it should be shorter than is the case with Camembert, and should have shrunk a little in the cheese-tub, to the extent at least that whey appears upon the surface. The hoops or cheese-moulds are usually 10½ in. in diameter by about 4 in. in height, and the ladle for scooping out the curd is similar in shape to the old-fashioned cream-skimming dishes in use in many dairies. The moulds are laid singly upon straw mats resting upon boards, and the curd is placed in them in horizontal thin slices.

The best cheeses are made of two curds, as described in the manufacture of Camembert. When the two curds have sunk just below the rim of the lower mould, the upper ring is removed, the cheese is covered with a clean straw mat and a board, and reversed.

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* An article on Camembert cheese, containing general directions for making soft cheeses, appeared in previous issues of this Journal, p. 456, Vol. II., and p. 216, Vol. XXV.

The cheese is again turned at the end of three or four hours, clean mats being used at each turning. It is essential that the mats be crossed at turning so that the marks of the straw show in cross section. This is important, as when the straws are crossed air is admitted more readily to the under surface and ripening is more regular. When the cheese is firm enough to admit of the hoop being removed, it is salted on the surface with fine dry salt, which should be spread very evenly upon the whole surface. After the first salting the cheese is left for from eight to ten hours, and then turned on to a round osier mat termed a *clayette*. It is then again salted upon the now upper surface and the sides, and removed to a drying room which is kept at a temperature of from 63 degrees to 65 degrees Fahr., to shelves so placed that gentle currents of air can be admitted over the surface of the cheeses. When placed in this drying-room, the cheese is solid and rather firm, but friable and very acid.

In the course of a day or two, if the cheese has been properly made, there should appear upon the surface a white fungus mycelium which grows rapidly in a warm and fairly moist atmosphere. With the best cheeses a reddish mould succeeds the white mould, though with many of the coarser cheeses a blue mould succeeds the white. The latter, though common, are not the true type, a cheese growing a red mould being always superior in quality.

When this red mould is well established on the cheeses, they are removed to the cellar or cave where ripening is completed. If the cheeses are to be kept for any length of time they should be placed in very cool dry cellars at an early stage in the ripening process.

It will be gathered that the method of manufacture of Brie is somewhat different from that of Camembert. The object of the maker is to conserve more moisture in the curd and to ripen in a shorter period. Hence coagulation of the milk is slower, and the temperature of the making-room is lower. These two factors tend to slow and incomplete drainage during the first stages. After being properly formed and salted, the cheeses are placed in the second ripening-room at a higher temperature, and this room is kept more moist than would be the case with Camembert. This tends to rapid growth of the moulds and quick ripening, and a soft texture in the cheese. In the cellar the temperature will vary, depending in a great measure on the period at which the maker wishes to dispose of the cheese.

The cheeses when ripe are usually cut up into diamond-shaped pieces, placed in boxes of the same shape, and retailed in this form.

Pont l'Eveque.

The cheese known as the Pont l'Evêque has acquired a considerable reputation in England, and, though usually designated a soft cheese, it is of a type entirely different from the Camembert and Brie.

The ripening of this cheese is not dependent upon the growth of moulds, but is probably largely due to the enzymes of rennet introduced in a comparatively large quantity during the first stage of manufacture.

The cheeses are either square or oblong with "rounded corners." They are $1\frac{1}{4}$ in. in thickness, and weigh about 1 lb. each. When ripe, they present a brownish-red exterior, are pliant and yielding to the touch, and the peculiar flavour somewhat resembles that of a very fine soft Edam cheese, though more sweet to the taste.

In the manufacture of this cheese the lactic acid ferments play a very unimportant part. Indeed, it is the practice to rennet the milk and so handle the curd as to exclude as far as possible the action of lactic acid producing ferments. A milk at all acid or to which a lactic acid starter has been added is altogether unsuitable for the manufacture of Pont l'Evêque. If at

all acid during the first stages of manufacture, the cheeses dry and get hard uickly, and fail to take the salt. In the later stages they get hard and dry, nd are of no value.

The Pont l'Evêque cheese is somewhat difficult to manufacture. The various mechanical processes are simple enough, but the whole secret of success depends on the ability of the maker to determine when the curd is ready to hoop. Perhaps not more than 1 per cent. of English makers are really able to determine the exact stage at which to hoop the curd. If at this stage the curd is too hard and dry, the cheeses will drain inordinately and become hard; whereas if the curd is too moist or has been chilled, the cheeses will contain an excess of moisture, and in the course of a few days will spread out into an unshapely mass in the curing-room and become quite unpalatable.

The cheeses are rendered more difficult of successful manufacture by the very fact that acidity of the curd during the earlier stages is not admissible.

The method of manufacturing Pont l'Evêque is as follows: About 50 lb. (for six cheeses) of perfectly fresh new milk should be strained into a wooden tub of 6 gallons capacity. If the milk has fallen to below 90 degrees Fahr., then it should be raised to this temperature or a little higher before rennet is added.

The usual setting temperature is from 90 degrees to 94 degrees Fahr., and rennet of a good standard brand is added at the rate of 1 dram (mixed with 6 drams of water) to each 20 lb. or 2 gallons of milk. Many makers add a quart of boiling water to each 5 gallons of milk before putting in the rennet. This is good practice, as it tends to the production of a soft cheese. It will be observed that the proportion of rennet used is comparatively large, and this is necessary if the cheeses are to ripen properly, for, as already stated, the ripening is almost entirely due to the enzymes contained in the rennet.

After the addition of rennet, the milk is stirred carefully at intervals for 4 or 5 minutes, and then covered up and kept as warm as possible In from 30 to 40 minutes coagulation will be firm and complete. At this stage the curd is cut vertically with a long knife into 1-inch square sections, which are then cut diagonally across. This cutting is done to ensure rapid drainage of the whey from the curd, and should be carefully and thoroughly performed. A sharp-edged skimming dish or flat scoop is now inserted about three-fourths of an inch deep, thus cutting the curd horizontally, and the curd is ladled out into warm straining-cloths thrown over wooden forms resting on a draining-table. This operation should be done quickly and carefully, as it is necessary to keep up the temperature. When all the curd has been ladled out, the corners of the cloth should be brought together but not tied. The curd will drain more quickly if spread out in a thin layer, and the temperature can be kept up by the use of warm dry cloths spread over the surface. The cloths should be opened out and the curd moved at intervals, drainage being assisted in every way without injuring the quality of the curd.

If the curd has been properly handled, drainage should be complete in about 30 minutes, and the curd should then weigh about one-third of the original volume of milk. At this stage the curd is partly broken up with the fingers and carefully placed in the little hoops or forms which rest in pairs upon straw mats spread over boards. The curd is taken in the fingers and pressed closely and firmly against the sides and bottom of the hoops so as to secure a smooth surface, and great care is necessary to finish the cheeses so that they present a close unbroken exterior. So soon as the moulds are filled they are turned in pairs upon other dry straw mats and boards, and this turning is repeated six or eight times during the first hour. The object of the cheesemaker should be to secure a close tight surface, as unless the surface is close the cheeses will lose moisture by excessive drainage and be spoiled.

The temperature of the making-room should be kept at 65 degrees or 68 degrees Fahr., and the cheeses should be ready to salt in from 12 to 16 hours after the milk was renneted. The proper stage at which to salt is when the cheeses smell yeasty and are a little greasy upon the outside. Rapid digestive changes occur in these cheeses, and a knowledge of the exact stage at which to salt is important. In salting, the cheeses are lightly covered all over with salt, a little extra being added on the upper surface. Later they are turned and again salted in a similar manner.

The cheeses are kept in the making-room for about three days, and are then taken to the curing-cellar, which is kept at 58 degrees to 60 degrees Fahr. They are laid on sparred shelves covered with wheat straw, and are occasionally washed with weak brine to prevent the formation of mould.

When the ripening process has proceeded for 16 or 18 days, the cheeses are packed together in layers of three to conserve moisture, and occasionally their position is reversed in order to secure uniform ripening. The period of ripening usually extends to 5 or 6 weeks, and when the cheeses are ripe they should be soft, but not creamy. A good cheese will show a slight bulging of the sides, and when cut should be uniformly ripe throughout. In this respect it differs from the Camembert and Brie, which ripen gradually from the outside towards the centre.

When ripe, the cheeses are packed singly in suitable chip boxes, and realise from 10d. to 1s. each retail. When properly made, they are excellent, and are not so perishable as many other soft cheeses.

Cream Cheeses.

Cream cheeses are extensively manufactured in England during the summer months, but almost every dairy has its own particular method, and no really serious attempt has been made to put upon the market cheeses of uniform quality and flavour.

In flavour the produce of different dairies varies widely, no two dairies being alike, and the flavour of the greater portion of the cheeses made is objectionable. Many makers appear to think that any sort of cream is good enough with which to make cream cheeses, but this is a mistake. If the cheeses are properly made with the best cream, no more profitable branch of dairying exists than the manufacture of cream cheeses.

Cream intended for cheese-making should be perfectly fresh and sweet to commence with, and any ripening necessary should be undertaken before the cream is placed to drain. The old method of draining the cream by hanging up in a bag or cloth for two or more days is a mistake, as by the time the cream has drained sufficiently it has assumed a bad flavour, which is reproduced in the cheese. In judging the cream-cheese classes at shows it is found that the flavour is at fault in 90 per cent. of the exhibits, and this is almost always due to the protracted period of drainage.

In general, two varieties of cream cheeses are manufactured—the one known as double-cream, from cream containing about 50 per cent. of fat; and the other from thin cream which is thickened with rennet before drainage takes place.

If it is required to make the sweet variety of cream cheese, the cream is drained after standing 12 hours, but if a certain amount of ripening is desired, then a small quantity of starter (usually about half a pint to each gallon) is strained into the cream immediately the temperature has been reduced to 60 degrees Fahr.

This starter may be either a pure culture of lactic acid bacteria, such as is used by most cheese-makers, or it may be a little clean soured milk.

Double-cream Cheese.—A really good method of making double-cream cheese may be described as follows:—

The cream is taken off thick, and if pasteurised will be so much the better. It is then cooled in cold running water till the temperature is down below 60 degrees Fahr., and is allowed to stand at this temperature for 12 hours.*

The cream is drained in fine linen or longcloth spread over a wooden form, and this form is provided with a loose board which can be weighted when necessary to press out the superflous moisture.

The cream should be put to drain on a level slate or marble slab or table, and if it has been properly treated only skim milk should exude.

A form large enough to make up one or two gallons of cream at a time will be 18 in. long, 14 in. wide, and 4 in. deep. The pressing board should be 1½ in. thick, and made of sycamore or canary wood. The fine cloth is thrown over the form and pressed down to the level of the table, and the cream then poured in to the depth of 1 or 1½ in., covering the whole inner area of the form. The edges of the cloth are now turned over and neatly adjusted so as to cover the whole surface of the cream, the board is placed on, and left for half an hour with a 7-lb. weight on it. Drainage must be gentle at first, or the pores of the cloth get filled with cream. The cloth should be opened out once or twice during the first hour and the sides scraped down, when the cream should be reweighted with a 14-lb. weight. If the cream is thick and has been properly cooled and prepared before drainage, it should be ready to mould in 3 or 4 hours from the time it was put to drain. It will have drained sufficiently when the curd weighs at the rate of 16 oz. to each pint of cream used. A small tinned-copper mould holding ¼ or ½ lb. is used, lined on the inside with a strip of parchment, the mould being then placed in the centre of the muslin or paper wrapper and the cheese filled in with a wooden knife.

The cheeses are sold fresh or ripened, but it must always be remembered that cheeses made from fresh cream are perishable, and will not retain a nice sweet flavour for more than two or three days. Those who have a quick sale for their produce may venture to manufacture their cheeses from sweet cream, but, if the cheeses are to be kept for any length of time, then the cream should be slightly soured before drainage. Lactic acid is a preservative, and tends to prolong the flavour and keeping qualities of most varieties of cheese.

It is however, essential that the starter be of right flavour, or the quality of the cheese will suffer. On no account should the cream be allowed to sour naturally, as by the time the cream has become sour the flavour will have suffered otherwise. Natural souring can be hastened by keeping the cream at a higher temperature, but such a procedure results in a greasy cheese, which rapidly becomes rancid. If it is necessary to salt the cheeses, the salt should be added to the cream, about 1 oz. to each gallon of cream usually being sufficient.

These cheeses realise 4s. 6d. per dozen wholesale, or 6d. each retail.

Single-cream Cheese.—A very good cream cheese of poorer quality, but having more of a cheesy flavour, can be manufactured from cream containing from 25 to 30 per cent. of fat; many persons prefer this type of cream cheese. In this case also the cream must be cooled to 65 degrees Fahr., and three or four drops of rennet per gallon together with a little starter should be

* Thick cream cooled over a refrigerator does not make good che ses, the product tending to be coarse and open in texture. The proper method is to cool the cream in pails in cold running water. An interval of 12 hours between separation and drainage is necessary as this develops the flavour and assists in after drainage.

added immediately the cream is cooled, when the whole is left for 8 or 12 hours before draining. If necessary, salt may be added to the cream at the same time as the rennet. With a cream that has been coagulated, it is necessary to use a ladle with which to lift out the curd into the cloth. The after methods of preparation and moulding are the same as those already described for double-cream cheese.

The single-cream cheeses can be sold at a lower price, as they contain a fair proportion of casein; the wholesale price is usually 3s. 9d. per dozen, or 5d. each retail.

Cheeses of whatever quality will always be of uniform condition and flavour if made as described. The essentials necessary for the production of prime quality cream cheeses are:—(*a*) A sweet cream carefully cooled and prepared, and ripened at a low temperature; (*b*) the addition of salt to the cream and not to the finished curd; (*c*) the use of fine *dry* cloths in which to drain off the superfluous moisture; (*d*) to have the cream spread out in a layer of not more than 1 or 1½ in. deep in the draining form; (*e*) slight pressure during the first stages, increasing gradually to not more than 14 lb.

Neatly printed wrappers should also be used, and if the cheeses are sold wholesale they should be packed in wood pulp boxes holding half a dozen each. It must always be remembered that cream cheeses are particularly liable to become tainted, and hence care should be taken to have all cloths clean and draining forms and boxes made of materials that will not taint the cheeses.—"Journal of the Board of Agriculture."

BUYING PIGS.

Treatment of Young Pigs.

Next to selecting a good breed, the most important point for the purchaser is to make sure that the animals offered for sale are in a perfectly healthy condition. The following hints in this connection are worth noting:—See that the pigs are good feeders and that they are bright in the skin. Old hardy stores in poor condition will, of course, have a rough hide, but it should not be hide-bound, or stye-baked, or scurfy. Their eyes should be bright and wide open; their tails should be well twisted; and if they stretch and rub themselves well against anything they may come in contact with, it is one good sign that they are in a thriving condition. If they appear dull and listless, go about with drooping heads, and huddle themselves in a heap when let out of a sty to have a run, they are not in sound condition.

In cold weather a young pig will naturally crouch and shiver when exposed to the weather, and, like most other young creatures, whether human or of a lower creation, will want to get back to its bed. But if they appear this way inclined in the summer, and want to creep into the straw, they should be avoided. A man with a practised eye can quickly see if they are thriving and doing well in a farmyard, paddock, or breeder's sty; but when they are carted and moved about, it is more difficult.

When buying pigs which are in a sty, it is well to have them let out into a yard to have a run; anyone can then see if they are about straight. During the winter and wet months of the year, when cramp is often prevalent, it can then be seen if they are quite free from this. When cramp is on them, they usually look rather dull and dirty about the eye and face. Never buy a "pig in a poke"—that is, in a sty, without letting it out for a run, when any disease or defect will easily be detected.

Now about sties: Uncleanliness in the sty and yard should always be avoided by those who wish to keep their pigs in a healthy condition. The

Plate XXIII.

Pure bred Pigs at the Queensland Agricultural College.

animals should never be allowed to stand up to their hocks in muck to eat their food, nor to lie in it. A pig feeling inclined to go and wallow in a muck-heap or in dirty water is another affair altogether, and so long as he carries out his natural inclination there is not much harm to fear. The pig does not wallow in dirty water or muck because it loves dirt, but it does it because it wants to cool its body, which is always too warm for comfort; and if it has access to cool, clear, fresh water, it will bathe in this in preference to the dirty water. When a pig is penned up in a dirty wet sty day after day, and where, perhaps, around the feeding trough all is dung and muck, it will first put its foot in the muck and then into the food, and thus will actually have to consume a quantity of this muck, which looks more like breeding disease than not.

On many farms a lot of pigs are fattened in a sty. Not long ago we saw some fifty pigs being fattened in a couple of sties in a Chinaman's garden at Mount Gravatt, on the Logan road. Often a sow farrows in a sty and brings up a lot of pigs. As soon as they are ready to move, the sty is cleaned out and a bundle of litter is put in, and another lot of pigs are placed there at once, or another sow is put in to farrow there. This is done time after time, perhaps from one year's end to another. Or, if the sty lies empty for a time, it is unintentionally so, or perhaps it remains in the state it was in when the last lot were removed, till it is found to be wanted, when it is cleaned out and some more pigs are put in.

It stands to reason that such a sty has had no chance to be purified, and that there will be bad stale smells on the floor and sides, which cannot be good for pigs, even if it does not actually cause disease.

Every time a sty is emptied, it should be thoroughly cleaned and scraped out, walls well lime-washed, some loose lime thrown all over the floor, and the place left exposed to the wind and air for a week or more. This would cost a mere trifle, and the pigs would thrive much better than if put into a tainted sty. Some pig-keepers may think this of little significance, but we consider it to be of the utmost importance.

In all pig-breeding the object is to raise such animals as will produce the meat required by the manufacturer, and the latter requires lean medium-sized bacon. To this end it is most important to be careful in the selection of a breed. Most pig-breeder in this State believe in the medium Berkshire, which, if properly fed, will, at seven months of age, produce the best description of bacon for the market, and will turn the scale at about 12 stone dead weight—or 15 to 16 stone live weight. The utmost care must be taken in the selection of the boar, since it is the boar that gives shape, points, and quality to the herd, while the sow furnishes the internal structure and the frame. When buying a boar, therefore, make a point of examining the herd and the quality and uniformity of the sows and their progeny. A good boar will be of gentle disposition, will have plenty of hair, true markings; the breadth across both shoulders and loins will be uniform, the hams full, the sides deep and of good length consistent with size. Such a young, well-developed boar may be used for stud purposes at nine months old. As for the sow, she should be long, roomy, active, and vigorous, with deep ribs and full hams, a good feeder, so that she may develop a big supply of milk, and should not have less than twelve teats. She should not be put to the boar until she is eight months old. Finally, it should be borne in mind that the keystone of successful pork production lies in the

Treatment of the Young Pig.

When the pigs are taken from the sow, it is for the owner to decide whether he will sell them or feed them on. If the former, it is advisable to sell them off the sow when they are at their best. But, if they are of good

age, and good growing sorts, they will do as well when weaned as when with the mother. If he has a good lot of pigs, they will pay him to sell, or pay him to keep on. But if the sow has not suckled them well, or they are not good growing sorts, then he will find it difficult to get even a low price for them, and he will have to keep them a long time before he gets any return for his money. The next question the owner must ask himself is—What shall he finally do with them? Make them into small porkers, as many of our small farmers do; or run them on as stores and growers, and then fatten them; or sell them when they are worth £1 to £1 5s. each to some other feeder? Room and convenience must decide this, or whether he has any more sows coming down soon, so that he will want the sties for them. If he has a quantity of milk, he may think it cannot be better utilised than in making the pigs into small porkers of 56 lb. weight and upwards. So we will treat of the management of feeding the newly-weaned pigs into porkers.

A good growing pig will turn itself into profit quicker, of course, than a slow-growing pig. A large rompy pig is not suitable. A Berkshire or a cross between the White Yorkshire and the Berkshire is as good as any. The young pigs must be kept not only growing, but fat and sleek from weaning time. If milk in any quantity is given, there will not be much trouble to do this, and with milk it will be safer to use a quantity of meal. If they have been used to running about, then, if convenient, let them out for an hour or so every day; but if there is no run for them, see that they are supplied with plenty of green food, cinders, earth, &c., such as they would pick up in a paddock. Some of our suburban pig-keepers contract with the proprietors of hotels, restaurants, eating-houses, &c., for waste food and house-wash, &c. Sometimes these contain a large amount of salt or brine, and this is most injurious to pigs. In large quantities salt is a deadly poison to any pig. Another injurious substance is washing soda, which often gets into house refuse. So great care must be exercised in feeding with such material.

When the pigs have been weaned about a month they may have a little meal mixed with their other food, and nothing is better for finishing them off than barley; and by the time they have reached a weight of 60 lb., they may be given two-thirds meal and one-third middlings. The latter are cool—barley is heating—and, for that reason, too much barley meal, when the pigs are very young, is apt to overheat them and make them break out in the skin. By giving it by degrees as they get older and stronger, they will take no hurt. If wheat is fed, it must be in very small proportions—about one-fourth mixed with barley meal in a month from weaning. Maize is not to be recommended for small porkers, as the meat will not be of good quality, but inclined to be flabby. Boiled potatoes are also unsuitable for finishing off small weight porkers.

The feeding of large, heavy, fattening pigs is the simplest matter imaginable, and yet one man will make them pay while another loses by them. Milk, of course, produces magical effects in pig-feeding, and it should be given as regularly as possibly, not giving a quantity one day and none the next. Given half milk and half water, a pig will do better on 1 quarter of meal than on double the quantity with nothing but water. Feed them three times a day, with stirred food the first and last meal and some whole corn or peas in the middle of the day. This will bring them along as quickly as any way. The mid-day meal should also be supplemented with a little green food, and some cinders, coal, or earth.

Always let the fattening pig have access to a trough of clean water, for, if they are fed on food stirred thick, they become very thirsty. Treated in a common-sense way, good pigs will rapidly fatten and repay the cost of their keep. The accompanying illustrations of pigs at the Queensland Agricultural College were taken by Mr. H. W. Mobsby, artist-photographer to the Department of Agriculture and Stock.

Plate XXIV.

KING GEORGE V.'S QUEENSLAND CHARGER.

The Horse.

KING GEORGE V.'s CHARGER.

In the funeral procession of the late King Edward VII., His Majesty King George V. rode a fine charger, which had a mysterious brand on the left shoulder. By means of this brand, however, which is about 5 inches long, and reads "2 G.D. 20," an Australian gentleman—Mr. A. B. Macdonald—discovered that the horse was bred by him on Grosvenor Downs Station, near Nebo, in Queensland.

The discovery was made under somewhat romantic circumstances, for, apart from the fact that the horse was brought back from India by the King after his tour in 1905-6, little was known of the animal's birthplace and origin.

A magnificent bay, standing 15½ hands, the King's horse did not need a pedigree to recommend it.

Happening to see a photograph of the charger, Mr. Macdonald, who now claims the famous animal as one of his own breeding, recognised a familiar marking on the left shoulder of the horse. It at once struck him that the animal originated from his station in Queensland. He, therefore, wrote to Balmoral Castle, asking for particulars concerning it.

At the direction of King George, inquiries were made by Captain O. Hickey, superintendent of the Royal Mews, Windsor, who had the horse examined, and found the brand read "2 G.D. 20," which is the brand used by Mr. Macdonald.

The history of the brand is as follows:—

"2 G.D.," registered 13th September, 1872, in the name of William Forlonge, Grosvenor Downs, Nebo.

Transferred, 26th May, 1883, Alexander Bonar Macdonald, Grosvenor Downs, Nebo.

Transferred, 22nd June, 1909, J. W. and W. M. Allan, Grosvenor Downs, Nebo.

Transferred, 9th November, 1910, John Henry Clark, Grosvenor Downs, Nebo.

CLOTH FROM BANANA FIBRE.

An account is contained in the "Board of Trade Journal" for 28th July, 1910, of an exhibit of banana cloth that was made at a recent fair in China. It appears from this that the fibre is manufactured from banana stalks by the following process:—The stalks at the age of about one year are unrolled and steamed over water, until they become soft; after this has been done, the outer skin is removed by means of a scraper, in which the strips are passed between two blunt blades. The parts left after the outer skin has been removed is enclosed in a cloth and partly dried by being pounded. After this the fibre is shredded and twisted into thread, which is then weaved.

The process is only in the experimental stage at present, so that the price of the cloth is high, £1 3s. 6d. being asked for a roll 5 yards long and 1 yard wide. The claim is made that the cloth shows very good lasting qualities, and there is a possibility that its manufacture on a larger scale will lower the price, so that the product may be enabled to compete with others for summer wear.

The Orchard.

THE FRUIT FLY PEST.

By CHARLES ROSS, Instructor in Fruit Culture.

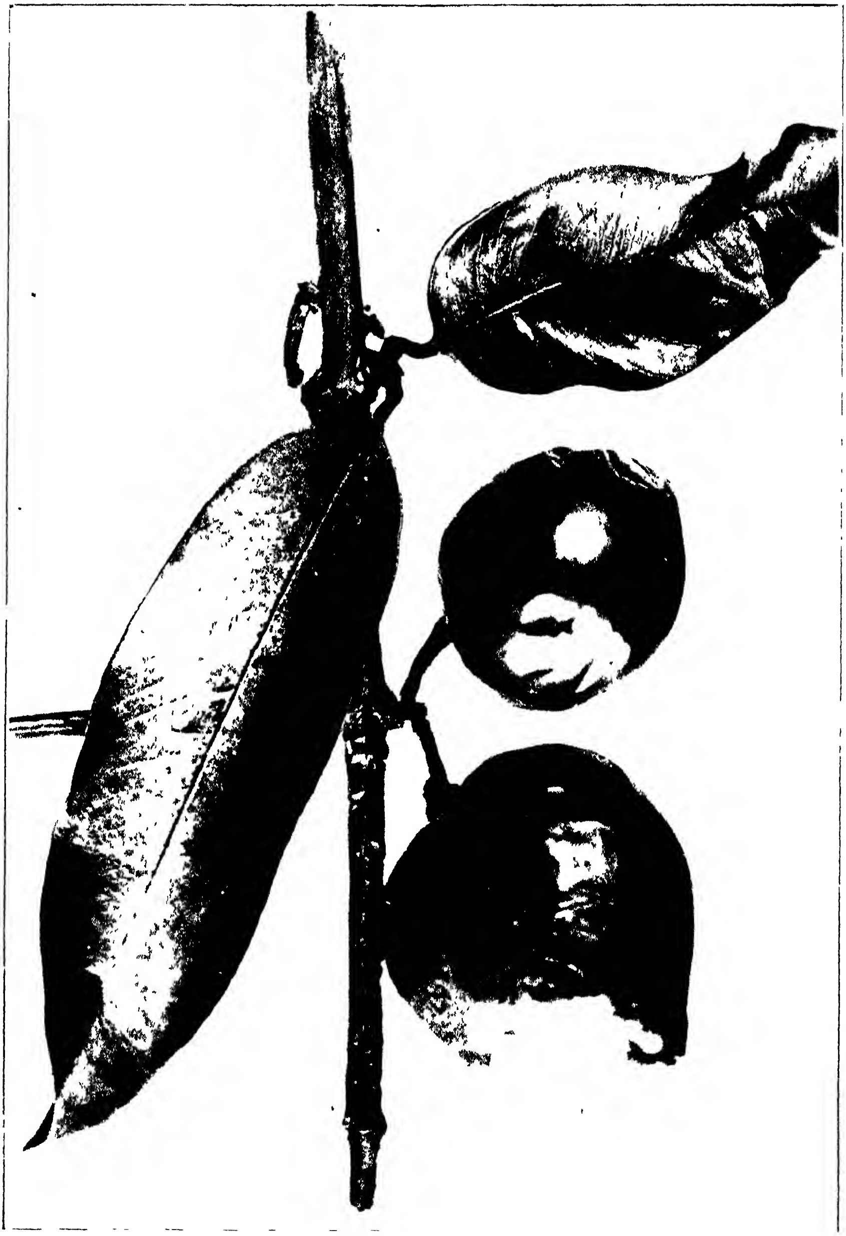
How to check the ravages of the fruit fly, and how to compass the extermination of this orchard pest, has always presented itself to orchardists and entomologists as a problem which up to the precnt remains unsolved. Various have been the means adopted to this end, but at best only indifferent success has rewarded the experimentalists. It seems as though we must await the discovery of some parasite which will prey upon the fruit fly only, and not attack useful insects when the work of extermination of the fly has been completed, as in the case of the mongoose, which was imported into the West Indies to destroy the snakes, and, when that was satisfactorily achieved, played havoc with ground game and poultry.

Mr. Charles Ross, Instructor in Fruit Culture under the Department of Agriculture and Stock, writing on the subject of the fruit fly, says:—" The early months of the growing season embrace the most important period for the destruction of fruit flies, and it is perhaps necessary to remind those who have not already destroyed the remnant of the orange crop that they should immediately do so, either by burying or boiling all unmarketable and infested fruit. Fruit flies, as a rule, do not appear in the orchards of the Warwick and Stanthorpe districts until the season is well advanced, and this to a great measure proves that the fly is not bred there during the winter, but is introduced from the warmer districts. Therefore all those interested should unite to fight the danger when it appears. It may not be so necessary to remind those who look to fruit-growing as a source of income as the amateur, whose few ill-kept trees are a menace to the industry. Spraying is absolutely useless to check this pest. The best practical means known for preventing its spread is to examine all fruit trees before packing and destroy the affected portion, together with all windfalls. There are several remedies of great service. Deep raking or shallow cultivation beneath the trees will enable fowls and other birds to get at the maggots that have previously entered the ground. The maggot, after leaving the fruit, burrows in the earth to a very shallow depth, from which it issues a full-grown insect within about three weeks, so that every fly or maggot killed prevents many broods developing. The whole orchard should be periodically cleaned, preferably soon after rain. Lime, soda, kerosene, and caustic top dressings, applied separately to the soil surface, are all fatal to the grub. Covering the trees with fine-meshed netting before the fruit changes colour is a very effective means of protection. Many flies may be caught by hand or by means of a net. Another simple device is to hold a piece of lath in each hand when a fly settles, and, while holding one lath behind the fruit, to strike the fly with the other. Leaving a single tree ungathered often localises the evil, and thus the maggot can be more easily destroyed. Suspending obnoxious substances in the trees, as well as tempting odours with poison, have been tried, but without much success. Kerosene tins placed here and there in the fruit garden as receptacles will often act as preventives to visitors spreading the fly. It often happens that after opening a tempting looking peach disappointment leads to the fruit being thrown underfoot, where the maggot finds a congenial home to hybernate. I would point out that, above all, concerted action is required, and regulations cannot be too stringent to prevent infested fruit

Plate XXVII.

Bananas Grown at Redland Bay by Mr. Dickens

Plate XXVI



Mangosteens on the Burdekin Delta, N.Q.

Plate XXV.

MANGOSTEENS AT PORT DOUGLAS, N.Q.

Plate XXVII.

MANGOSTEEN AT PORT DOUGLAS, N.Q.

from being distributed. Owners of private gardens might be of great assistance to the fruit-grower by exercising vigilance and care when making presents of fruit. Generally the orchardist diligently combats this pest. It is the private owner of a few trees only who, either through ignorance or through carelessness, is the chief offender. Consumers and non-producers might also assist the man on the land if they were willing to give this subject a little thought."

A prolific breeding-ground for the fly is an abandoned orchard, where the trees are left to themselves. It would be well if Shire Councils would enact a by-law compelling owners of such places to uproot the trees, and, failing their doing so, to carry out the work at the owners' expense, as in the case of noxious weeds.

QUEENSLAND BANANAS.

Banana-growers in the Southern districts of the State appear to pay more attention to the cultivation of good sorts than the Chinese in the North. Of late some of the finest bananas we have seen anywhere have come from Mooloolah, Pialba, Mount Cotton, and Redland Bay. In the April issue of the Journal, we depicted and described some very fine bananas grown by Mr. Preston at Mount Cotton, which were far superior in flavour, size, number of fruit per bunch, and weight than any Fijian fruit we have seen. Now we have been shown some bananas grown by Mr. Dickfuss at Redland Bay. Mr. Charles Ross, Instructor in Fruit Culture, happened to be visiting the district, and called on Mr. Dickfuss, whom he found busy packing fruit for the Sydney market. He picked out an ordinary bunch, which excelled in every way those above mentioned. The hands averaged 32 fruits or "fingers" each. These were selling at 10d. per dozen, equal to about 2s. 2d. per hand. The uniformity in size of both Mr. Preston's and Mr. Dickfuss's fruit throughout the whole bunch is a feature which is greatly wanting in the Fiji fruit.

A very successful banana-grower is Mr. Alick Thompson, of Takura, Pialba Line. Mr. Ross paid the plantation a visit, and was able to verify the following results:—

Mr. Thompson, 21 months ago, planted 1½ acres with bananas. The land is rather steep, the soil metamorphic calcareous, with good drainage, and a north-easterly aspect. He commenced cutting his first crop on 4th May, 1910, and continued cutting up to 23rd September. The net result of that cutting was £171, and at the time of Mr. Ross's visit he estimated that fully £100 worth net would be cut immediately. Thus, the 1½ acres will return a clear profit of £271 in the season, the whole of the fruit being readily sold at 10d. per dozen.

QUEENSLAND MANGOSTEENS.

For a long time all attempts to introduce the mangosteen into Queensland, whether as plants or seed, resulted in failure. Later, however, some were successfully imported, and a fine tree here depicted has been bearing fruit for a considerable time at Port Douglas. On the Lower Burdekin there are some trees of the variety *Garcinia cornea,* a native of India, which is edible; but it is said that its principal value lies in a species of gamboge which is extracted from the fruit. None of the genus, of which there are nearly 200 species, are recorded as possessing deleterious properties, but only a few are utilised as fruits.

Tropical Industries.

THE FUTURE OF RUBBER.

Use for the Northern Territory.

Dr. Barrett, of Melbourne, passed through Fremantle to-day, on board the R.M.S. "Orontes" (says the "Daily Telegraph," Sydney, 5th October). Dr. Barrett is connected with the Port Swettenham Rubber Company, which has large interests in rubber plantations in the Federated Malay States. Desiring a health change, the doctor decided to travel out of the States, and report on the properties whilst there. He also gleaned some particulars about the properties belonging to the Bukit Kulin Company. Dr. Barrett said: "I found that the great problem facing rubber-growers in all countries was how to produce a commodity equal to the wild rubber of Brazil. So far, the physical properties of this wild rubber are far superior to plantation rubber. Probably this difference is explained in the preparation, since the plantation rubber in Borneo, Singapore, Ceylon, and the Federated Malay States is all grown on most diverse soils and in diverse climates. All the same, through the rubber world the attention of growers is to make the two products identical in their properties. Apart from tin, rubber is the greatest industry in the Malay States, as the soil and climatic conditions suit the commodity admirably. The thoughtful people in the Malay States look forward to the time when rubber will be quoted at 2s. per lb., or, thereabouts, without any reduction. At that price a handsome profit will always be shown, and the hope is expressed that rubber will yet be vastly used in the world. However, such a state of things is obviously far away at present."

"What has become of the rubber boom?"

"Well, so far as the boom which has just passed away is concerned, it differs from any other boom that has ever come under my cognisance. Rubber has always been a solid and highly organised industry. While experimental investigation has always been carried out in the Malay States and elsewhere, by a staff of experts provided by the Government for the purpose of conducting experimental work in tropical agriculture, it has always been a stable industry in the Malay States, despite the boom, because Englishmen have gone out to the plantations, and planted these huge zones with trees. They have been Englishmen of the very best sort."

"Is the rubber industry going to stay?"

"It seems to me it must, for trees are grown in all sorts of soils and climates, and they are free from the pests and diseases indigenous to other marketable plants. For instance, in Ceylon, there is a dry season, and the early growth of rubber trees is slower than elsewhere for that reason. On the other hand, the trees in Ceylon seem remarkably hardy. In the Henerat Goda Gardens upwards of 40 rubber trees from Brazil were planted there 34 years ago. They have now become quite historic. One of these trees has a height of 100 ft. and a girth of 9 ft. When tapped last year, the yield was 98 lb. of rubber. When you realise that the age of plantation rubber trees now does not exceed ten years, you can understand what a great future lies before a commodity which is produced from trees so prolific and hardy. I don't know any other plant so free from pests and disease as the rubber plant. Of course, every one on the plantation is very watchful. Then, again, the rubber industry is conducted on more honest lines than others, for the reason that rubber is above ground, and is always visible.

When one considers the immense amount of wealth that has been poured into the Federated Malay States during the past five years, the honest industry is remarkable. I have come to the conclusion, after careful thought and consideration, that our great Northern Territory can be colonised by white people, providing certain areas are marked out, with those areas carefully under the jurisdiction of medical men, so that tropical diseases could be exculpated. The lessons of the East have taught me that there are no insuperable difficulties in the way of white colonists in a tropical climate. Often they feel in want of periodical changes. Well, if the transcontinental railway, which our political friends talk about, comes off, the Northern Territory colonist will necessarily be provided with cheap and expeditious means of securing the necessary change in the southern parts of Australia."

"Do you think rubber can be grown in the Northern Territory?"

"Most assuredly. A remarkable feature about the rubber industry is that the trees succeed in all sorts of climates and soils. The fact of the Northern Territory possessing a dry season does not debar the Northern Territory from growing rubber."

RUBBER AND THE EMPIRE.

So far as its surface effects of company promotion and abnormal values of rubber and rubber shares are concerned, the boom is over; but the cause of the boom—the immense world demand for rubber—remains and increases, and, as a consequence, there is a persistent activity in every part of the world where rubber can be grown, which seems to suggest that sooner or later there must be a big renewal of activity in the saleroom and the Stock Exchange.

From every tropical territory we are receiving daily news of planting and tapping experiments. Official reports of consuls and governors and directors of agriculture are continually coming to hand, and it is especially gratifying to notice the large part that is being played in the general movement by the various British colonies and dependencies. If the British Empire is one upon which the sun never sets, it may also be said that it is one where the latex never ceases to flow. Week by week we hear from East and West that new lands for the cultivation of rubber are being discovered or opened up; and if we were wont to congratulate ourselves upon holding the pick of the temperate regions, surely we have equal cause to be cheerful over our share of the tropics.

From Rhodesia, Uganda, or Ashanti; from British Guiana, Trinidad, or Tobago; from Australia or New Guinea—the tale is the same. The success of our planters in Ceylon and the F.M.S. has fired the imagination of British planters the world over, and even governors and consuls forget their staid officialism and speak enthusiastically of the new industry. Sir John Anderson, Governor of the Straits Settlements, in his speech at the Agri-Horticultural Show at Singapore, the full report of which is now to hand, said: "To-day the eyes of the world are focussed on the Malay Peninsula, where the area of land alienated for rubber runs into seven figures and that actually cultivated into 400,000 acres, a great part of which was already producing six years ago. Our export of rubber was then 5 tons, but before the end of the year I expect it will reach 60,000 tons. Even this is nothing like the advance I think will be made during the next five or six years. Something like a revolution has taken place in the rubber world. Before our very eyes and in our midst, shipping companies are

making over £4,000 sterling per week on shipments of rubber. At 2s. 6d. per lb., our rubber export in less than six years will be double the whole export trade of 1908."

Can we wonder, with such prosperity in the East, that the West is fired to emulation? Mr. W. N. Morrison's speech at the David Young Rubber Estates meeting gives an excellent idea of British Guiana's prospects as a rubber-producing country; while the fact that the Governor of the colony, when visiting the estate, congratulated all concerned on the condition of the property shows that the Governments of the West are as interested in the industry as are the Governments of the East. One thing is certain, however much the home-staying pessimist may despair: British planters the world over are convinced that rubber, in spite of the markets, is still booming.—"Rubber World."

THE SUITABILITY OF CENTRAL AUSTRALIA FOR RUBBER.

A correspondent of the "Rubber World" (London) takes exception to the statement made in that journal that the country of the interior of Western Australia was suitable for growing everything but rubber. He says: "I have felt it my duty to take exception to many of his statements, as I know that there are hundreds of miles of territory in the country he refers to which are practically useless for growing anything beyond the spinifex which is at present found there. I can say with confidence that no part of this country in the interior of Western Australia would be suitable for growing either Hevea or Ceara rubber. Your suggestion that the Government should experiment is a very good one, provided it does not attempt to experiment in the interior. I cannot help thinking that there are several parts of North Australia where rubber could be successfully grown, particularly in the Northern Territory and North Queensland. I am inclined to think that *Manihot Glaziovii* would flourish there, and there are many places in the districts I have named where it would be worth while experimenting with *Hevea brasiliensis*. If experiments were to be made in Western Australia, the most suitable places would be in the Kimberley district at Derby, Wyndham, and further north. For nearly a thousand miles south of those places the country is, in my opinion, unsuitable for growing rubber of any description, but it is just possible that there are places in the south-west corner where results might be obtained; but I repeat that experiments for the present should be confined to the far north or tropical Australia. Although I have no advice on the subject, I should not be at all surprised to hear that experiments have already been made in some parts of Queensland."

ON CLEAN WEEDING.

With reference to the question of clean weeding *versus* the planting of soil-protecting or soil-enriching plants, the views of the late Mr. J. B. Carruthers will no doubt be of interest. "The clean weeding of estates," said that distinguished authority, "as practised in the tropics is a legacy from experience in temperate countries, and has given excellent results, so that planters are not naturally inclined to abandon it. There are, however, certain conditions prevailing in the tropics which render clean weeding disadvantageous. The chief of these are as follows:—(1) Denudation by tropical rain is severe on land which is regularly weeded and consequently has its upper layers of soil in a loose and friable condition; (2) the soil thus lost is rich in plant food, and, though part of it may be recovered by

an efficient drainage system, the recovered portion is not respread, and consequently is of little value to the estate as a whole; (3) clean-weeded land dries and hardens in the sun, so that the upper layers of the soil become inefficient for cultivation purposes; (4) the cost of clean weeding sometimes forms as much as 60 per cent. of the total cost of working an estate, and labour needed for other purposes has often to be diverted to this work. These difficulties may be avoided by using cover plants to prevent the growth of grasses and weeds. Plants suitable for use in this way should have the following characteristics:—(1) They should shade the ground without producing an impermeable, matted surface; (2) they should remain green in drought; (3) they should be of sufficiently vigorous growth to prevent the growth of weeds, grasses, &c.; (4) they should not grow more than 2 ft. high, so that they do not interfere with the crop. It is, further, an advantage that the plants should be leguminous, so that the soil in which they grow may become enriched in nitrogen by their aid. The following provisional list of suitable cover plants is suggested:—*Mimosa pudica, Tephrosia purpurea* or *T. candida, Crotalaria striata* or *C. incana, Abrus precatorius, Mucuna pruriens, Desmodium triflorum, Vigna spp., Passiflora fœtida, Ipomœa batatas* (sweet potatoes)."

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1909 Oct.	Nov	Dec	1910. Jan.	Feb.	Mar	April	May.	June	July	Aug	Sept	Oct.
North.													
Bowen	0·36	3·15	19·98	15·45	7·10	21·45	5·26	0·18	2·23	0·58	0·18	3·75	0·30
Cairns . ..	3·19	7·31	15·24	21·80	17·12	24·16	16·13	3·51	6·59	Nil	3·59	1·34	1·67
Geraldton	6·71	14·57	19·98	20·35	34·57	33·74	24·57	11·90	19·35	1·34	7·42	11·51	3·18
Gindie State Farm .									2·65	1·45	Nil		
Herberton . .	2·39	4·50	5·11	16·64	12·21	12·40	3·50	1·85	1·70	Nil	0·88	0·58	0·43
Hughenden	1·95	0·54	8·01	4·52	3·59	2·95	0·30	0·41	0·85	0·18	Nil	2·75	1·57
Kamerunga State Nurs									Nil		3·59		2·06
Mackay	2·88	3·18	25·56	35·28	9·73	24·31	6·18	3·73	5·70	1·1	0·48	4·32	0·7
Mossman ..											1·91	2·90	3·17
Rockhampton	2·16	4·55	2·74	11·93	1·28	19·84	0·61	0·59	5·98	1·67	0·23	1·62	0·93
Townsville	2·07	1·31	11·51	23·07	10·85	17·21	2·20	0·26	1·05	0·33	0·3	3·34	0·11
South.													
Biggenden State Farm		2·83	6·06	7·22	3·09	3·82	0·73	1·06	5·25	0·92	0·28		2·36
Brisbane ...	1·56	4·14	6·45	7·24	4·19	6·17	1·22	0·43	6·71	0·39		2·72	3·27
Bundaberg	0·42	3·55	2·99	11·81	2·43	8·92	0·31	0·19	6·17	2·10	0·16	2·33	0·70
Dalby	1·92	2·13	2·45	10·88	1·33	3·87	Nil	Nil	6·06	1·42	0·64	2·11	3·96
Esk .	2·61	2·69	9·20	8·60	1·94	6·19	1·19	0·27	4·74	0·58	0·25	1·65	3·41
Gatton Agric. College	1·87		3·92	11·79		3·66	0·69	0·61	5·05	1·99	0·60		3·60
Gympie	2·30	3·82	16·54	5·92	3·18	7·74	1·13	0·22	5·57	0·83	0·32	1·51	2·90
Ipswich	1·93	1·56	4·72	6·91	2·78	3·50	1·65	0·20	3·74	1·67	0·58	1·55	3·70
Maryborough	0·51	3·94	6·83	5·65	2·99	3·92	1·72	0·64	4·89	1·09	0·75	1·22	1·53
Roma ..	0·90	2·12	1·05	4·74	1·47	8·36	0·15	0·4	5·71	1·24	Nil	0·46	3·64
Roma State Farm .												0·38	2·95
Tewantin .	3·82	1·90	8·85	5·96	3·42	15·18	6·30	1·31	15·08	0·76	1·31	1·52	3·17
Warren State Farm									1·88				0·45
Warwick	2·85	2·77	4·25	3·93	3·14	2·57	0·68	0·55	3·16	1·82	0·54	1·39	2·20
,, Hermitage State Farm			.	...	...	.			..	1·73	0·39	..	
Westbrook State Farm									2·77				2·98
Yandina . .	2·30	0·76	20·18	6·71	2·07	11·81	3·26	0·40	13·13	0·70	0·15	0·88	3·34

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND,
Divisional Officer.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

BY F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order MALVACEÆ.

TRIBE HIBISCEÆ.

FUGOSIA, Juss.

F. pedata, *Bail, sp. nov.* (Plate XXVIII., Fig. I.) A bush of 3 or 4 ft.; bark a purplish-red, clothed with a stellate tomentum, the stars rather large, and, like most other parts of the plant, the bark marked with large black dots. Leaves simple and ovate-lanceolate or pedately-digitately lobed, 2½ in. long, marked with large black dots, and clothed with large stellate hairs on both surfaces; petioles about 1 in. long, with the hairs and dots of the lamina. Flowers axillary or nearly terminal, on rather short peduncles. Bracteoles 3, linear-lanceolate, about 3 lines long, with large black dots. Calyx dotted inside and out, with large black dots, about ½-in. long, tomentose, the teeth ending in filiform points. Petals about 1 in. long, dots crowded, minute, hairy outside. No capsules with the specimens.

Hab.: Georgina River, *E. W. Bick.*

Order LEGUMINOSÆ.

Suborder PAPILIONACEÆ.

TRIBE GALEGEÆ.

SWAINSONA, SALISB.

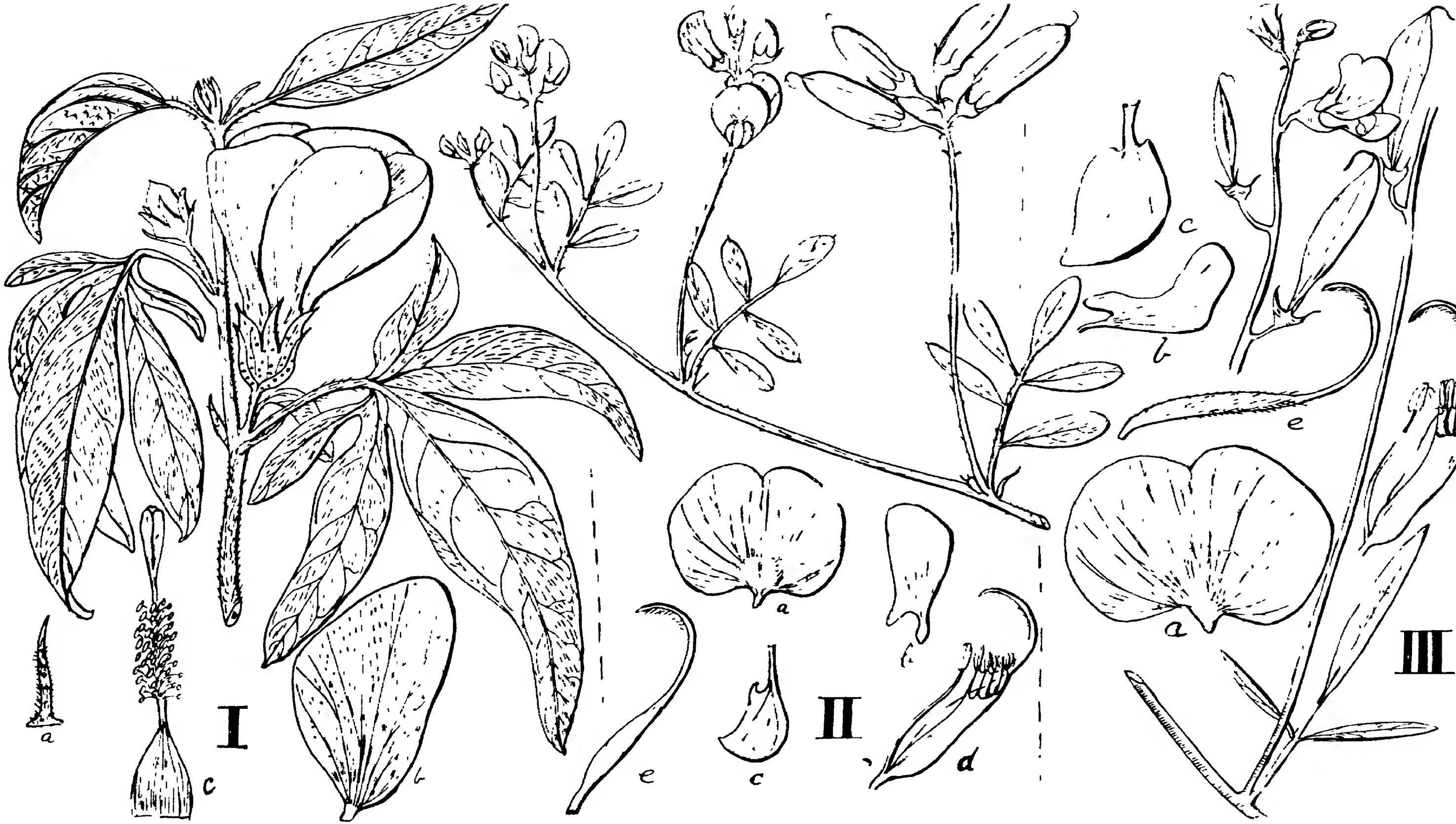
S. concinna, *Bail. sp. nov.* (Plate XXVIII., Fig. II.) A slender probably procumbent plant. Stems about 1 ft. long, bearing appressed almost bristle-like white hairs, dense at base of stems and ends of young growth; the leaves and stipules are also clothed with similar hairs. Leaflets 3 to 5, usually 5, very obtuse, tapering to the base, 2 to 4 lines long, sometimes slightly apiculate, and stipules rather long, lanceolate from a broadish base. Peduncles slender, 1 to 3½ in. long, terminated by a few lines of raceme bearing from 2 to 5 purplish flowers. Bracts and bracteoles minute. Calyx also bearing white hairs: tube 1 line long; the lobes thread-like, 1½ line long. Standard 4 or 5 lines diam.; callosity at the top of the claw is represented by a deep-green thickening of the part; wings about 3 lines long; keel a little longer. Ovary nearly glabrous; style slender, hairy near the stigma and incurved. Pod sessile, 7 lines long, rather narrow, inflated, few-seeded.

Hab.: Georgina River, *E. W. Bick.*

S. fragilis, *Bail. sp. nov.* (Plate XXVIII., Fig. III.) A thin wiry plant, rather scanty of foliage, 6 to 12 in. high, nearly glabrous except the young growth. Leaflets usually 3 or the lower ones solitary, linear lanceolate, the terminal one exceeding 1 in. long, lateral ones shorter, the larger ones slightly more than 1 line in diam. Stipules narrow-lanceolate, only a few lines long. Peduncles erect, slender, about 3 in. long, the racemous portion of equal length; pedicels numerous, bracts minute. Flowers purplish. Pedicels long as calyx. Calyx about 2 lines long, 3 lines broad under the pod. Standard 7 lines diam.; the callosity at the top of claw very prominent; wings small; keel broad, equalling the wings. Ovary silky pubescent. Style slender, incurved, with a few hairs towards the stigma. Pods 1 in. long, and 4 lines broad, inflated, on a stipes of 2½ lines. Seeds numerous.

Hab.: Georgina River, *E. W. Bick.*

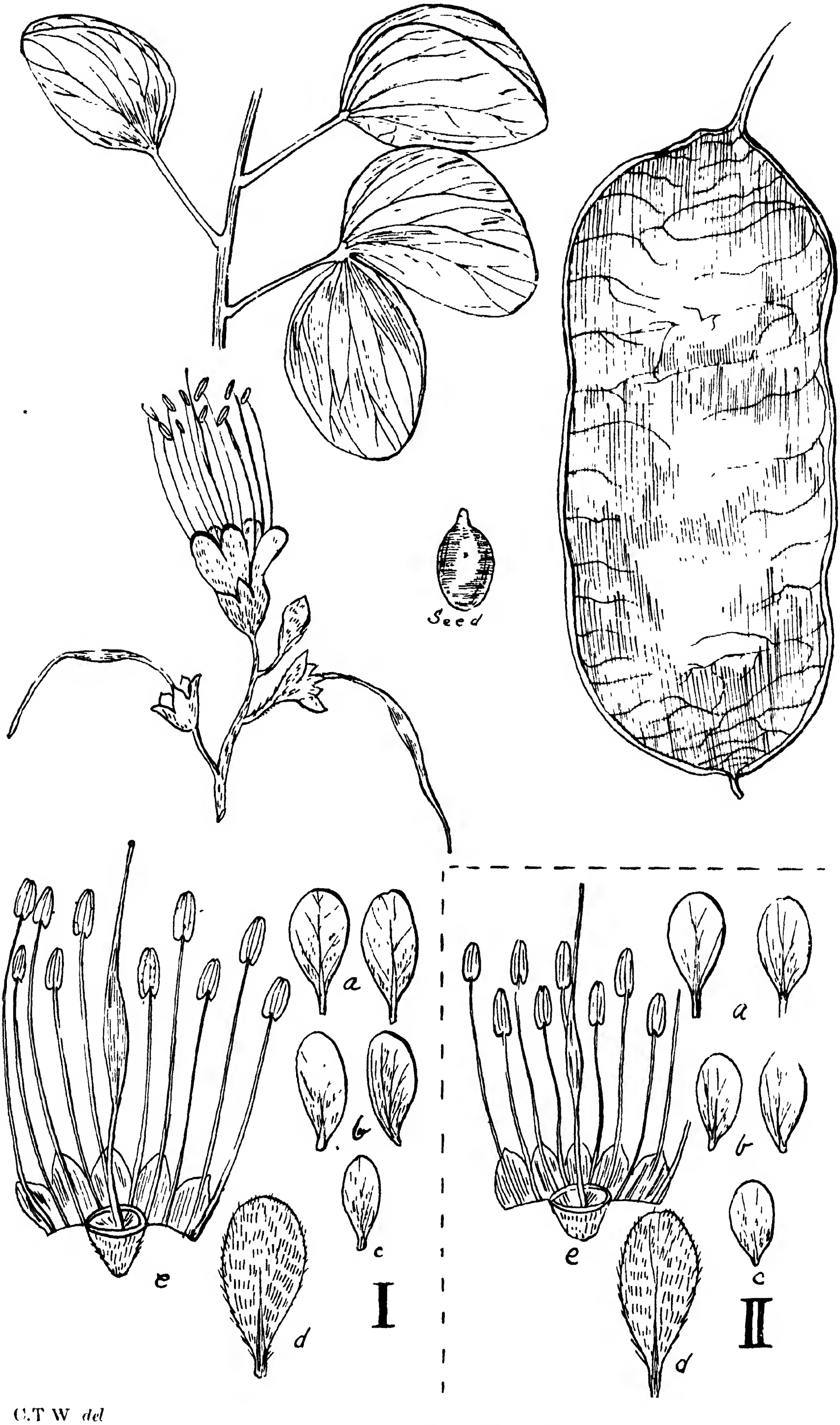
Plate XXVIII.



C.T.W. del.

I. *[illegible]*, Bail. sp. nov.—(a) bracteole; (b) petal; (c) stamens and pistil.
II. *Swainsona concinna*, Bail. sp. nov.
III. *Swainsona [illegible]*, Bail. sp. nov.—(a) standard; (b) wing petal; (c) keel petal; (d) stamens and pistil; (e) pistil.

Plate XXIX.



BAUHINIA CUNNINGHAMII, *Benth.*

I. *forma rosea*, Bail. n form.; II. *forma glabra*, Bail. n. form—

(*a*) 2 outer lower petals, (*b*) 2 lateral petals, (*c*) uppermost inner petal, (*d*) back view of a petal to show tomentum, (*e*) calyx laid open to show stamens and pistil.

SUBORDER CÆSALPINIEÆ.

TRIBE BAUHINIEÆ.

BAUHINIA, Linn.

B. Cunninghamii, *Benth.* (Plate XXIX.) In Queensland two very distinct forms of this tree are met with near the Georgina River; the principal distinction being shown in colour of flowers. I have thought it well to attach to them names in accordance with this feature—**forma rosea,** the one bearing rosy-red flowers; and **forma gilva,** the one bearing cream-coloured flowers. The petals and stamens of this latter kind are rather shorter than those of the former.

Hab.: Georgina River, *E. W. Bick.*

Order MYOPORINEÆ.

PHOLIDIA, R. Br.

P. Bickii, *Bail. sp. nov.* A dwarf, close-growing, dense, shortly hirsute shrub, bearing a large quantity of deep-blue flowers, seldom exceeding 18 in. in height and spreading often over 3 ft. Leaves crowded, linear lanceolate, mostly less than 1 in. long and 2 lines broad, margin ciliate. Flowers purple, deep-blue, solitary on peduncles of from 4 to 9 lines long. Calyx-tube about 2 lines long, the lobes and teeth of about an equal length, the teeth often with thread-like points. The corolla-tube extends 4 or 5 lines beyond the calyx, ending in rounded rather short lobes; throat of tube densely hairy inside. Filaments broad with ciliate margins. Fruit ovoid or ovoid-globular, 5 to 7 lines long, 4-seeded or less by abortion.

Hab.: Georgina River, *E. W. Bick.*

EREMOPHILA, R. Br.

E. rotundifolia, *F. v. M.* Branchlets hoary with a close tomentum and glandular tuberculate. Leaves nearly orbiculate, or broader than long, 3 to 4 lines diameter, thick, often complicated, with a short recurved, obtuse point, abruptly contracted at the base into a short broad petiole. Calyx-segments oblong-spathulate or almost obovate, about 5 lines long. Corolla-tube about 8 or 9 lines long, contracted above the ovary and slightly under the lobes, the lobes short and broad. Stamens scarcely exserted. Fruit ribbed, about the length of the calyx, maturing 2 to 4 seeds.—Flora Austr. V. 19, and Mueller's Myoporinous Plants. Tab. IX.

Hab.: Georgina River, *E. W. Bick.*

Order AMARANTACEÆ.

TRIBE AMARANTEÆ.

TRICHINIUM, R. Br.

T. nervosum, *Bail. sp. nov.* Stems erect, few, and seldom branched, from a perpendicular root, about 7 in. high, often red with grey woolly stripes; the upper leaves under the inflorescence often small, oblong, apiculate, sometimes not over 1 in. long and ½ in. broad; the lower stem ones 2 in. long, 1¼ in. broad, nearly or quite sessile; the radical ones spathulate, 3 in. long, 1¾ in. broad in the wide upper part; all of a firm thick consistence and apiculate, and sessile from the decurrent lamina upon the petiole to the base. Lateral nerves very pronounced, irregular as to number and direction, pink and glabrous. Spikes terminal, oblong, 2 to 3 in. long, 1⅓ to 1¾ in. broad, the rhachis densely hairy. Bracts transparent, for the most part ovate, about 5 lines long, 3 lines broad, the midrib prominent, ending in a more or less sharp point; bracteoles narrow and hairy on the back. Perianth recurved, about 1 in. long, woolly hairy, of a greenish colour; tube very short and densely hairy. Segments plumose, with long blunt, glabrous, involute tips; the inner segments much narrower than the outer; tip yellowish and glossy. Anthers 3. Ovary glabrous. This new species approaches closely **T. nobile,** which is very variable in form, but differs so much in general appearance, colour, and nervation that I have thought the present plant might better be given specific rank.

Hab.: Georgina River, *E. W. Bick.*

Order EUPHORBIACEÆ.

TRIBE EUPHORBIEÆ.

EUPHORBIA, Linn.

E. Stevenii, *Bail. sp. nov.* (Plate XXX.) Steven's Caustic Plant. A low branching shrub from 6 to 9 in. high and slightly exceeding that in breadth. Stem and branches fleshy, terete, very milky, dichotomous. Leaves scattered, soon deciduous, narrow, and somewhat obtuse or ovate-lanceolate, with a few sharp teeth towards a sharp point, about 1 in. long, mostly near the ends of the branches, with the flowers and fruit in their axils. Stipules minute. Flower-heads solitary, involucre 1 line long, glands 4 or 5. Capsule of 3 almost globose cocci, veined. Seeds rough with a deep suture.

Hab.: Found growing on little mounds of earth in the claypans of the Georgina River, where it is suspected of poisoning stock, *E. W. Bick.*

List of plant specimens collected by Mr. E. W. Bick near the Georgina River during his late visit to that locality in September-October last. The collector's numbers are given after the name; some, however, had not numbers attached to them:—

CAPPARIDEÆ—

Apophyllum anomalum, F. v. M. (No. 2.)
Capparis lasiantha, R. Br. (No. 25.)
C. nummularia, DC. (No. 43.)
C. Mitchellii, Lindl. Native Pomegranate. (No. 102.)

VIOLARIEÆ—

Ionidium aurantiacum, F. v. M. (No. 95.)

FRANKENIACEÆ—

Frankenia pauciflora, DC ; *var. thymoides*, Benth. A Salt Plant (thickly encrusted with salt). (No. 27.)

MALVACEÆ—

Malvastrum spicatum, A. Gray. (No. 84.)
Sida corrugata, Lindl. (No. 93.)
S. cordifolia, Linn.
S. spinosa, Linn. (No. 83.)
Abutilon Fraseri, Hook. (No. 87.)
Fugosia australis, Benth. (No. 86.)
? F. sp Seed sown at Botanic Gardens. (No. 49.)
F. pedata, Bail. sp. nov. (No. 82.)

STERCULIACEÆ—

Melhania incana, Heyne. (No. 85.)
Melochia pyramidata, Linn. (No. 98.)

ZYGOPHYLLEÆ—

Tribulus terrestris, Linn. Calthrops.

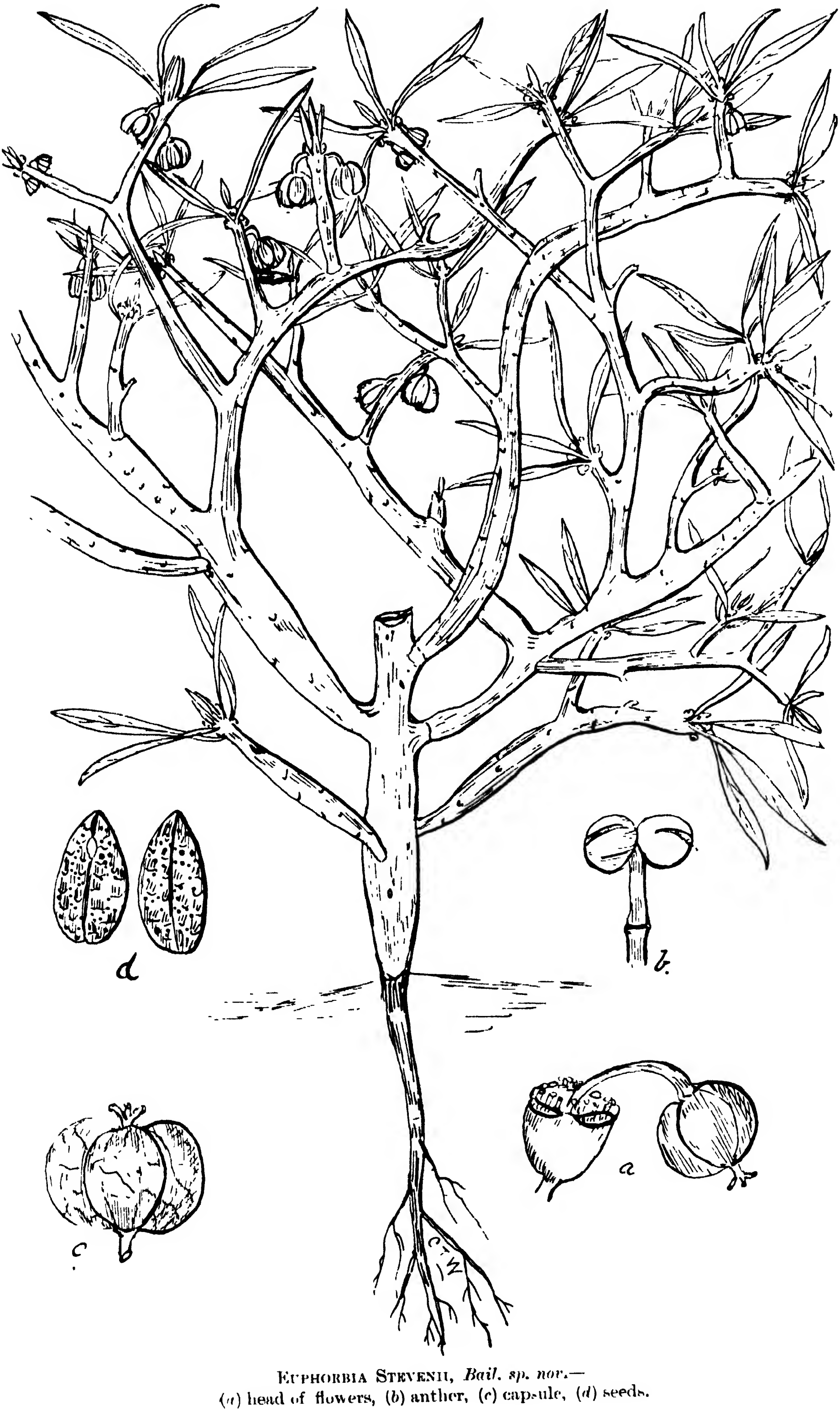
SAPINDACEÆ—

Atalaya hemiglauca, Benth. Whitewood. A Cattle Bush. (No. 53 and No. 104.)

LEGUMINOSÆ—

Crotalaria dissitiflora, Benth.
Trigonella suavissima, Lindl. (No. 68.)
Lotus australis, Andr (No. 67.)
Psoralea patens, Lindl. (No. 64.)
Sesbania ægyptiaca, Pers. (No. 42.)
Swainsona concinna, Bail. sp. nov. (No. 81.)
S. fragilis, Bail. sp. nov. (No. 92.)
Cassia desolata, F. v. M.
C. oligophylla, F. v. M. (No. 29.)
C. phyllodinea, R. Br. (No. 41.)
Bauhinia Cunninghamii, Benth., *forma rosea*, Bail. (No. 106.)
B. Cunninghamii, Benth., *forma gilva*, Bail. (No. 22.)

Plate XXI.



EUPHORBIA STEVENII, *Bail. sp. nov.*—
(*a*) head of flowers, (*b*) anther, (*c*) capsule, (*d*) seeds.

LEGUMINOSÆ—*continued.*

Acacia salicina, var. varians, Benth. (No. 26.)
A. stenophylla, A. Cunn. Dalby Myall. (No. 77.)
A. tetragonophylla, F. v. M. (No. 78.)
A. georginæ, Bail. Georgina River "Gidgee"; considered poisonous.

HALORAGEÆ—
Haloragis alata, Jacq.; a form. (No. 91.)

MYRTACEÆ—
Eucalyptus terminalis, F. v. M. Bloodwood. (Northern.) (No. 12.)

LYTHRARIEÆ—
Lythrum hyssopifolium, Linn. (No. 100.)

CUCURBITACEÆ—
Mukia scabrella, Arn. (No. 88.)

FICOIDEÆ—
Mollugo Glinus, A. Rich. (No. 60.)
Trianthema decandra, Linn. (No. 97.)

UMBELLIFERÆ—
Daucus brachiatus, Sieb. Native Carrot. (No 96.)
Eryngium rostratum, Cav. (No. 30.)

COMPOSITÆ—
Minuria integerrima, Benth. (No. 58.)
Calotis porphyroglossa, F. v. M. Purple "Bindii." (No. 63.)
Pterigeron adscendens, Benth. (No. 45.)
Pterocaulon sphacelatum, Benth. and Hook. (No. 37.)
P. glandulosum, Benth. and Hook.
Gnaphalium luteo-album, Linn. (No. 9.)
Helipterum incanum, DC.
Ixiolæna brevicompta, F. v. M. (No. 36.)
Craspedia chrysantha, Benth. (No. 7.)
Senecio lautus, Forst. (No. 32.)
Sonchus arvensis, Linn. A Sow Thistle. (No. 69.)

GOODENOVIEÆ—
Goodenia gracilis, R. Br. (No. 61.)
Scævola ovatifolia, R. Br. (No. 89.)

ASCLEPIADEÆ—
Marsdenia Leichhardtiana, F. v. M. "Doubah." Flowers and Pods eaten by the natives. (No. 55.)

GENTIANEÆ—
Erythræa australis, R. Br. Australian Centaury (a valuable tonic plant). (No. 62.)

BORAGINEÆ—
Trichodesma zeylanicum, R. Br. (No. 24.)
Heliotropium curassavicum, Linn. (No 59.)

CONVOLVULACEÆ—
Evolvulus alsinoides, var. sericeus, Benth.

SCROPHULARINEÆ—
Morgania glabra, R. Br. (No. 4.)

ACANTHACEÆ—
Ebermaiera glauca, Nees. (No. 44 and No. 107.)

MYOPORINEÆ—
Pholidia Bickii, Bail. sp. nov. A very beautiful deep-blue flowering ally of the Native Fuchsia. (Nos. 18, 19, 20.)
Eremophila rotundifolia, F. v. M. (No. 16.) All Plants of this Genus, under certain conditions, are considered poisonous.
E. Mitchelli, Benth. (No. 74.)
E. Latrobei, F. v. M. (No. 75.)

MYOPORINEÆ—*continued.*

E. polyclada, F. v. M.

E. bignoniæflora, F. v. M. (No. 71.)

E. maculata, var. flava, Bail. Fuchsia Bush (yellow flowering variety). (Nos. 73 and 76.)

LABIATÆ—

Mentha australis, R. Br. A Native Mint. A refreshing drink can be made from this plant. (No. 31.)

Teucrium integrifolium, F. v. M. (No. 3.)

NYCTAGINEÆ—

Boerhaavia diffusa, Linn. (No. 94.)

ILLECEBRACEÆ—

Dysphania myriocephala, Benth. (No. 57.)

AMARANTACEÆ—

Trichinium obovatum, Gaudich.

T. nervosum, Bail. sp. nov.

T. ærvoides, F. v. M. (No. 1.)

Alternanthera nodiflora, R. Br. (No. 54.)

CHENOPODIACEÆ—

Atriplex nummularia, Lindl. This and other plants of the Order are known as Salt Bushes. (No. 28.)

Kochia lanosa, Lindl. (No. 15.)

K. spongiocarpa, F. v. M.

K. sedifolia, F. v. M.

K. aphylla, R. Br.

Enchylæna tomentosa, R. Br. (No. 65.)

Sclerolæna lanicuspis, F. v. M. (No. 46.)

Salicornia tenuis, Benth. (No. 21 and No 56.)

POLYGONACEÆ—

Polygonum plebeium, R. Br. (No. 99)

P. attenuatum, R. Br. (No. 80)

Rumex halophilus, F. v. M. A Native Dock. (No. 35.)

PROTEACEÆ—

Hakea chordophylla, F. v. M. (No. 52.)

LORANTHACEÆ—

Loranthus quandong, Lindl. A Mistletoe. (No. 13.)

L. pendulus, Sieb. Weeping Mistletoe.

SANTALACEÆ—

Santalum lanceolatum, R. Br. (No. 11.)

EUPHORBIACEÆ—

Euphorbia Muelleri, Boiss. (No. 101.) Plants of this Order are often poisonous.

E. filipes, Benth. (No. 66.)

E. eremophila, A. Cunn. A Caustic Plant.

E. Stevenii, Bail. sp. nov. Steven's "Caustic Plant." (No. 23.)

Phyllanthus maderaspatanus, forma. (No. 103.)

GRAMINEÆ—

Isilema Mitchellii, Anders. Landsborough Grass. (No. 47.)

Sporobolus Benthami, Bail. An excellent pasture grass. (No. 70.)

S. Lindleyi, Benth. (No. 34.)

Deyeuxia Forsteri, Kunth. (No. 6 and No. 33.)

Chloris scariosa, F. v. M.

Eragrostis interrupta, Beauv. (No. 48.)

E. chætophylla, Stend. (No. 5 bis.)

E. falcata, Gaudich. (No. 5.)

NOTE.—The suspected poisonous plants have been submitted to Mr. J. C. Brünnich, Agricultural Chemist, for examination.

Chemistry.

PLANTS POISONOUS TO STOCK.

The Poisonous Principle of Native Fuchsia.—*Eremophila maculata.*

BY J. C. BRÜNNICH AND F. SMITH.

The reputation of "Native Fuchsia" as a plant liable to be poisonous to stock is of long standing, although mentioned by F. Turner, in his "Forage Plants of Australia" (1891), as "making capital fodder for both cattle and sheep." It is classed as such by F. M. Bailey and P. R. Gordon, in "Plants Reputed Poisonous and Injurious to Stock" (1887); and is again noticed by F. H. Maiden, in his "Plants Reputed to be Poisonous to Stock in Australia" (1897).

Attention has again recently been called to the probable poisonous properties of Native Fuchsia by an epidemic of poisoning among cattle upon Roxburgh Downs and Carrandotta Stations, in the Boulia district, in December, 1909; it being among specimens of suspected plants collected by Inspector H. O'Boyle, M.R.C.V.S., in the poison country of these stations, and submitted to the Government Botanist for identification.

The Veterinary Inspector reported (22nd January, 1910) to the Principal Veterinary Surgeon and Bacteriologist, Mr. S. Dodd, on his visit to the station, and concludes—

(*a*) That deaths are due to stock eating some poisonous shrub;

(*b*) That the green leaves contain the poison, as none of the shrubs were in flower or fruit;

(*c*) That the poison acts on the heart;

(*d*) That fatigue, excitement, &c., especially after beast had had drink, increases the mortality."

In a note attached to this report, Mr. O'Boyle also states—

"*Deaths of Bulls at Barcaldine.*—I at the time attributed deaths to dipping acting on the skin, preventing cutaneous respiration, &c. Now I believe, whatever the poisonous plant is on Carrandotta and Roxburgh, a similar plant had a lot to do with their deaths. Our works manager travelled some sheep through Carrandotta a few years ago, and, after the sheep ate the Fuchsia leaves, he lost heavily, the animals dying without any symptoms; so it is reasonable to suspect Native Fuchsia as the plant, and the poison would resemble in its action hydrocyanic acid."

Subsequent experiments with Native Fuchsia carried out by Inspector O'Boyle with sheep left no doubt as to the extremely poisonous nature of the plant.

Cases of poisoning on Roxburgh Downs and Carrandotta in August and September of the present year occasioned further investigations. The feeding experiments with Native Fuchsia conducted by Mr. O'Boyle at Lake's Creek in September are noteworthy; and the results are given herewith as taken from his report to the Chief Inspector of Stock (dated 31st October, 1910):—

(1.) A sheep, fed with eight green pods and about one ounce of green leaves, showed slight effects of poisoning in half an hour, and quite recovered in six hours.

(2.) Same sheep, fed next day with about half a pound of green leaves (amongst which may have been one or two green pods), died in an hour. On P.M., found both cavities of heart full of fluid blood; and on opening of rumen could detect smell of prussic acid.

(3.) A sheep fed like No. 2—Twenty minutes later: Fore and hind legs moving spasmodically, twitching lips, gives an occasional bound as if jumping over some obstacle. Later staggering gait, breathing quick, passes fæces and urine, lies down. Third stage: Coma, breathing laboured, pupil dilated, heart quick and weak, legs extended. The sheep was dead in less than an hour. P.M.: Cavities of heart empty and no congestion of the stomach; otherwise similar to previous sheep.

(4.) A bullock was fed (three weeks later) with some freshly cut Native Fuchsia left over from a sample forwarded to be analysed, and with a quantity about six times as large as that given to the sheep; it showed no ill-effects.

A portion of the plants, used by Inspector O'Boyle for the last experiment, were received at the Agricultural Laboratory in a good fresh condition, and consisted of stems and leaves with a very small number of green pods.

The small number of pods was particularly noticed, and may have something to do with failure of Experiment 4.

The material was submitted to examination as follows:—

A.—A portion of leaves and fruit was macerated with water, and after standing a few hours examined for hydrocyanic acid. Distinct indications of presence of hydrocyanic acid were obtained;

B.—Leaves alone were similarly examined, but no hydrocyanic acid was detected;

C.—A small portion of the fruit alone gave no reaction for hydrocyanic acid;

D.—Portions of leaves macerated with water and treated with emulsion of sweet almonds gave strong tests of hydrocyanic acid;

E.—A portion of air-dried leaves were treated with emulsion of sweet almonds and distilled a yield of ·297 per cent. (23·5 grains per lb. of dried leaves) of hydrocyanic acid was obtained, equivalent to about 6 to 8 grains of hydrocyanic acid per lb. of green leaves.

The poisonous principle of the Native Fuchsia, which must be responsible for cattle mortality in the Boulia district, is therefore a cyanogenetic glucoside, a body of similar nature to the amygdalin of bitter almonds and the toxic substance dhurrin of immature sorghum. It possesses properties common to these bodies—that is, while not necessarily in itself poisonous, it is decomposed by an enzyme or ferment accompanying it in the plant, either upon maceration in water or when taken into the stomachs of animals, yielding the deadly hydrocyanic acid or prussic acid. Since 1 grain of hydrocyanic acid, an amount contained in from 3 to 4 ounces of fresh leaves, may be considered a lethal dose for a sheep, the extreme toxity of the Native Fuchsia is at once seen.

We are of opinion, however, that the enzyme in *Eremophila maculata* does not—at least at the period of growth when the examination was made—accompany the glucoside in the leaves, but occurs separately in the fruit, which themselves do not appear to contain a hydrocyanic acid yielding principle. Explanation is thus had of the fact that no reaction for hydrocyanic acid was obtained from either leaves or fruit alone, but only when in association, or when treating the leaves with an enzyme of similar nature, the emulsion contained in sweet almonds. We know of no similar case among the numerous other hydrocyanic acid yielding plants.

An explanation is also afforded of the results obtained in Mr. O'Boyle's experiments, when the leaves were found to be toxic when fed together with a few fruits of the plants, whereas the fruit themselves were non-toxic, and support is also given to the popular contention that the plant is most dangerous when in fruit.

The results also show how important it is, when making feeding experiments with suspected plants, to create various conditions, as a really poisonous plant may cause no ill-effects until some other substance, contained in fruit or seeds of the same plant or in some other plant, is eaten at the same time.

It is desirable to ascertain by periodic examinations whether Native Fuchsia contains the glucoside at all periods of growth and to extend the investigation to other members of the order of Myoporineæ, all reputed poisonous plants.

Note.—The determination of the presence of a cyanogenetic glucoside in *Eremophila maculata*, a member of the purely Australian order Myoporineæ, is of peculiar scientific interest. A brief chemical examination—which we hope to extend at a later date when fresh material is available—indicates that the glucoside is difficultly decomposable by acids, and yields an aldehyde similar to benzaldehyde in properties, though the amount of material at our disposal did not permit its identification with the latter.

Times of Sunrise and Sunset at Brisbane, 1910.

DAY.								
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·29	5·47	4 58	6 5	4·46	6·28
2	6·2	5 34	5·28	5 48	4 58	6 6	4·46	6·28
3	6·1	5·34	5 27	5·48	4·57	6·7	4·46	6·29
4	6 0	5 35	5 26	5·49	4·56	6 7	4·46	6·30
5	5·59	5 35	5·25	5 49	4 56	6·8	4·46	6 31
6	5·58	5 36	5·24	5 50	4·55	6 9	4 46	6·31
7	5·57	5·36	5 23	5·50	4·54	6·9	4·46	6 32
8	5·56	5·37	5·21	5·50	4·54	6·10	4·46	6 33
9	5·54	5 37	5·20	5·51	4 53	6·11	4·46	6 33
10	5·53	5 37	5·19	5·52	4 52	6·11	4 47	6 34
11	5 52	5·38	5·18	5·52	4·52	6·12	4·47	6·35
12	5 51	5·38	5·17	5·53	4 51	6·13	4·47	6·36
13	5·50	5·39	5·16	5·53	4 51	6·14	4·47	6·36
14	5·49	5·39	5·15	5·54	4·50	6·14	4·48	6·37
15	5·48	5 40	5·14	5·54	4 50	6·15	4·48	6·37
16	5·46	5·40	5·13	5 55	4·49	6·16	4·48	6 38
17	5·45	5·41	5·12	5·56	4·49	6 17	4·48	6·39
18	5·44	5·42	5·11	5·56	4·49	6·18	4·49	6·39
19	5·43	5·42	5 10	5·57	4·48	6 18	4 49	6·40
20	5·42	5·42	5 9	5·57	4·48	6·19	4 50	6 40
21	5·41	5·42	5·8	5·58	4·47	6 20	4 50	3·41
22	5·40	5·43	5 7	5·58	4·47	6·21	4 51	6·42
23	5·38	5·43	5 6	5 59	4·47	6·22	4 51	6·42
24	5·37	5·44	5·5	6 0	4·47	6·22	4·52	6·43
25	5·36	5 44	5·4	6·0	4 47	6 23	4·52	6·43
26	5·35	5·45	5·4	6 1	4·46	6·24	4·53	6·43
27	5·34	5·45	5·3	6·2	4 46	6 25	4·53	6·44
28	5·33	5 46	5 2	6·2	4·46	6·25	4·54	6·44
29	5·32	5·46	5·1	6·3	4·46	6·26	4·54	6·44
30	5·30	5·47	5 0	6·4	4·46	6 27	4·55	6·45
31	...	...	4·59	6·5	...	...	4·56	6·45

PHASES OF THE MOON.

			H. M.
4 Sept.	●	New Moon	4 6 a.m.
12 „	☾	First Quarter	6 11 „
19 „	○	Full Moon	2 52 p.m.
26 „	☽	Last Quarter	6 54 a.m.
3 Oct.	●	New Moon	6 32 p.m.
11 „	☾	First Quarter	11 40 „
19 „	○	Full Moon	0 24 a.m.
25 „	☽	Last Quarter	3 48 p.m.
2 Nov.	●	New Moon	11 56 a.m.
10 „	☾	First Quarter	3 29 p.m.
17 „	○	Full Moon	10 25 a.m.
24 „	☽	Last Quarter	4 13 „
2 Dec.	●	New Moon	7 11 a.m.
10 „	☾	First Quarter	5 5 „
16 „	○	Full Moon	9 5 p.m.
23 „	☽	Last Quarter	8 36 „

Horticulture.

THE BURSTING OF CARNATIONS.*

Carnation-growers are familiar with the often serious tendency of the blooms to split the calyx, or burst, as the trouble is commonly called. The immediate cause of bursting appears to be a too rapid or premature petal development before the bud as a whole has made its growth. It is very prevalent in some varieties. F. Dorner, senr.,** says: "There are numerous varieties which habitually split the calyx and are worthless. There are also some which under certain circumstances split what appears to be the strongest kind of a calyx, while, on the other hand, some large flowers are held intact by an apparently weak one." It goes without saying that worthless varieties should be abandoned. Growers have learned from experience, however, that unfavourable cultural conditions may cause serious cases of bursting among varieties which are profitable bloomers when properly grown.

Although there are well-established methods for the general culture of greenhouse carnations, certain varieties differ sufficiently in their requirements to call for specific treatment in some form or other. Such specific treatment must be determined from cultural experience. On the other hand, the fragmentary literature on the subject of bursting would seem to warrant the general statement that plants which have been hardened off or grown slowly, whether through a low temperature, dry soil conditions, or a lack of fertiliser, are very apt to produce bursted blooms when suddenly overstimulated either by too much heat, moisture, or plant food, or through some unfavourable combination of these conditions.

The Maryland Station reports an investigation along this line, in which it appears that a location unfavourable for uniform temperature and moisture conditions will aggravate the bursting tendency. Such a location is found in the rear part of a side bench, when there is no space between the bench and the wall:—

"It was noticed that the row of carnations located near the glass of the side benches produced more bursted flowers than did the other rows on the benches. During the winters of 1904-5 and 1905-6, a record was kept of the good flowers and the bursted flowers on the different rows. . . . The row nearest the glass produced 21 per cent. of bursted flowers, while only one other row gave as high as 7 per cent.

". . . . It was found almost impossible to secure uniform conditions near the glass, the soil drying out badly, although receiving a normal supply of water. Many growers find less trouble with this bursting of the calyx when the benches are so placed as to allow a walk between them and the side walls."

The walk next to the wall provides for free air circulation around the bench, thus lessening the danger of excessive sun heat and, in some cases, of excessive bottom heat as well. Side ventilators can be used with greater safety and the bench will be given close inspection.

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* Compiled from Maryland Sta. Bul. 127; Rhode Island Sta. Bul. 128.

** Amer. Breeders' Assoc. Proc., 3 (1907), p. 67-71.

The Rhode Island Station recently reported an experiment in which the principal object was to determine what influence, if any, nitrogen has upon the tendency of the calyx to split open. Three varieties were used in the work in order to determine whether the same results would be secured regardless of varietal tendencies. The varieties were Hector, Wm. Scott, and Lizzie McGowan: " A long, narrow bench was divided into two equal beds, each 26 in. wide by 8 ft. 9 in. long. Like amounts of subsoil were then placed in each. . . . The manurial treatment was identical, excepting that on the east plat no nitrogen was applied, while on the west plat nitrogen in a nitrate, an ammonium salt, and inorganic matter was applied." The experiment was carried on for two years.

" With nitrogen in the manures a great advantage resulted with the variety Hector, both in saleable blossoms and the number of those with a perfect calyx.

" With the variety Lizzie McGowan, the results were in favour of the use of the nitrogen, especially the first year of the trial, but were far less marked than with the Hector.

" In the case of the variety Wm. Scott, the results were better where nitrogen was omitted than where it was employed.

" The results show that when the house is maintained at the same temperature, generous manuring with nitrogen may increase the total number of perfect blossoms of one variety of carnations and lessen the number of another variety.

" Whether the same differences, as a result of the manuring, would appear if the most favourable temperature for each variety were maintained in the house is yet to be determined.

" It appears probable that the character of the manures, as well as the degree of forcing, tends to affect the splitting of the calyx."

C. W. Ward, in the following words, points out how the carnation breeder may lessen the bursting tendency:—" In selecting a seedling for the second year's trial, be sure of a firm, large, well-formed calyx, for if you fail to select good firm calyces of 'bursters' may be your reward."

The commercial grower likewise can reduce the trouble by studying the habits and requirements of the individual variety, and by so regulating the various conditions in the greenhouse as to prevent sudden fluctuations in the rate of growth. Although it is doubtful whether the bursting of the blooms can be entirely eliminated, further investigations along this line may lead to methods of control which will reduce the trouble to a minimum.

Science.

A RESEARCH ON THE PINES OF AUSTRALIA.

By RICHARD T. BAKER AND HENRY G. SMITH.

Just eight years ago the two authors published their classical work, "Research on the Eucalypts," and now we have the pleasure to review a work of equal importance, published under authority of the Government of the State of New South Wales, in their Technical Education Series No. 16—"A Research on the Pines of Australia."

The joint authors made a complete study, both from a scientific and commercial point of view, of our Australian Pines. On account of the general distribution of these trees, the work is of great value to our State, and it should teach us to appreciate the great asset we possess in our forests, and particularly lead to the immediate institution of a thorough system of re-afforestation with such valuable and quick-growing trees.

The genus *Callitris*, to which our common Cypress Pine belongs, has been treated most fully, both by botanist and chemist; and a new sequence of the species, founded upon these investigations, has been advanced. The peculiar resins of the Cypress Pine were exhaustively investigated, and the well-known immunity of the Cypress Pine timber from the attacks of the white ants is attributed to a new phenolic body, "Callitrol," which also gives the timber its peculiar aromatic and characteristic odour. The bark of the Cypress Pine contains large amounts (up to 36 per cent.) of tannins of the catechol group, and the bark has therefore a great commercial value for our tanneries. From the leaves an aromatic oil, equal to the best "pine-needle oil," may be obtained.

The Pines of other genera—such as *Auracaria* (Hoop pines), *Agathis* (Queensland Kauri), and others—are also fully treated, and many new points in the anatomy and chemistry have been elucidated.

The work is lavishly illustrated with a large number of photographs, micro-photographs, and maps, and the main object of the publication, to quote from the introductory remarks of the Hon. J. A. Hogue, Minister of Public Instruction—"to stimulate a more lively and more permanent interest among the general community in the scientific and commercial possibilities of this particular section of our native flora"—has been well accomplished.

Animal Pathology.

LIVER FLUKE.

Last November it came under the notice of Mr. J. W. Dunlop, cream inspector, Toowoomba, that large numbers of young stock had been dying in the Elbow Valley district from some unknown cause. On examination of the livers of some dead animals, he found in them several worms which he suspected were those known as *Distomum hepaticum*, or Liver Fluke Worm. He accordingly forwarded some specimens of the worms to the Department of Agriculture and Stock. They were submitted to Mr. A. H. Cory, Government Veterinary Surgeon, who, after examination, reported as follows:—

"The specimens forwarded are undoubtedly the ordinary Liver Fluke *(Distoma hepaticum)*. Sheep and cattle are commonly affected by them. In sheep up to 2 years of age and cattle up to 2 to 2½ years, there is greater mortality than with older animals.

"The disease is noticed more particularly after heavy rain, humidity having a great deal to do with the cause. Thus it will easily be understood that cattle or sheep, on low-lying, damp, swampy ground, with an impermeable clay subsoil, are more subject to this complaint. It would be of the greatest interest if some specimens of molluscs (snails) were forwarded for examination, as the one which usually acts as the intermediate host in Europe—viz., the *Limnoea Truncatula* (unknown, I believe, in Australia)—has a shining shell ⅜-in. in length, with 5 turns in the spiral. There are, I consider, other varieties in this country which propagate the disease, but investigations on this point are required.

"The prevention and treatment of the disease are as follows:—Drain all swampy land and fill in stagnant waterholes. If the land cannot be drained, pasture horses or adult cattle on it, but do not allow them afterwards on damp land which is known to be free from the disease. It is also recommended that hares be exterminated. Frogs and toads are very useful in exterminating snails.

"Salt marshes and salt licks destroy the fluke, and it is recommended that, where practicable, some 300 or 400 lb. of salt be applied to the land per acre, or allow about 2 oz. of salt to each adult animal (cattle) and 2 to 4 drachms for sheep, as a lick or mixed with food. Overstocking of paddock should be avoided. Curative treatment is not too reliable, but iron and salt will be found as useful as most drugs.

Salt 2 oz., sulphate of iron 2 drachms, for cattle once or twice daily in food or as a drench.

Salt 2 to 4 drachms, sulphate of iron 15 to 30 grains, for sheep.

"Oil of turpentine is sometimes given mixed in milk or oil, allowing about 1 drachm for a sheep, and 2 oz. for cattle."

Poultry.

THE ART OF CAPONING.

Being an Attempt to Describe how the Operation should be Performed.

The following excellent description of the operation of caponing we take from the "Illustrated Poultry Record," London, December, 1909:—

It is strange, considering the simplicity of the operation, how few poultry-keepers practise the art of caponing young male birds, and still more strange since it is possible under certain conditions to make the work very profitable. It is not so many years ago since the number of experts who followed this branch of table-poultry could be counted on the fingers of one hand; now, fortunately, there are a larger number of poultry-keepers who are able to perform the operation, but still the market demand at Christmas is considerably in advance of the supply, and there is opportunity for many others to work in this direction. Briefly stated, the advantages of caponing are as follow:—(1) Capons mature more rapidly, and grow to a larger size than would cockerels; (2) the flesh of an 8 or 9 months old capon is as tender and juicy as that of a spring chicken; (3) capons can be run indiscriminately with males or females during the growing period; and (4) the value per lb. of capon flesh is higher than that of ordinary cockerel flesh.

It must be understood that we do not advocate this branch of table-poultry production for all poultry-keepers, for under certain circumstances it would undoubtedly pay better to dispose of the birds when 3 to 4 months old at the then market price. The conditions under which capons can be raised successfully are those which are usually found in what is termed farm poultry-keeping—where poultry form only one part of the stock maintained, or where there is ample room for them to have their liberty. The reason for this is that as the birds have to be fed for some 5 months after they reach a killing age, if all foods have to be purchased the profit is largely eaten up by the food bill; but if the conditions are such that the capons can be turned out on to the stubble after harvest, then on to plough land or on to pasture, they will gather for themselves practically all that is required to keep them growing steadily until it is time to fatten them for market. This branch can also be worked profitably when market gardening is run in conjunction with poultry-keeping, for in this case a large amount of the feeding stuff can be composed of the unsaleable vegetable produce.

We have stated that this is an attempt to describe the operation of caponing. We have put it this way, for we realise how difficult it is, even with photographs, to teach the art by a written description, but we believe that if our instructions are carefully carried out in detail anyone will be able to perform the work successfully if they (1) do not object to the sight of a little blood; (2) are not made sick by the peculiar smell arising from the organs of the body; and (3) are not nervous or likely to get flurried. The last-mentioned is very important, for if the work is hurried in any way fatal results are likely to accrue, but by this we do not mean the operator is to dawdle. Remember there is a great difference between working rapidly and hurrying. Provided the following instructions have been mastered, not longer than 10 minutes should be taken with the first bird, from the time the first cut is made to the last stitch. As showing how simple the operation really is, we may state that an expert can handle 18 to 20 birds in an hour.

As the object of caponing is to make large birds, only those which belong either to the table or the general purpose class should be used. Cockerels from 10 to 12 weeks old are best for the purpose. As the abdominal portion of the

body has to be opened, it is advisable to starve the birds for 24 hours so that the intestines may be practically empty. The appliances necessary, besides the instruments, &c., shown in Fig. 1, are a table about 2 ft. 6 in. wide, a bowl of very cold water in which a few grains of permanganate of potash have been dissolved, and a couple of clean dusters. The remainder of the tools required are described below the photograph. The cockerel is taken, and the noosed end of the cord attached to one half brick is passed over the wings and tightened at the shoulders; the other is fastened round the legs above the hocks. The bricks are then dropped over the sides, the left side of the bird resting on the table, as seen in Fig. 2. The area which has to be plucked as in Fig. 3 is douched in cold water, and the feathers are pulled out. The effect of the cold water is to deaden the sensitiveness of the skin, and thus the bird hardly feels any pain. One of the dusters is now taken, soaked in

Fig. 1.—(A) Half-bricks with cords attached for holding bird in position.
(B) Knife
(C) Spreaders for opening wound during the operation
(D) Sponges made of cotton wool twisted round the ends of matches.
(E) Forceps for taking hold of the testicles.
(F) Surgical needle and silk for stitching wounds.

cold water, and folded so that it forms a strip some 2 in. wide, and this is placed over the feathers in front of the plucked area, as shown in Fig. 3.

The most difficult part of the operation is to locate the exact position for cutting. Great care must be exercised in finding it. To describe it, we must touch on the question of the anatomy of the fowl. There are seven ribs on either side, springing from the backbone. The first two of these, counting from the front of the bird, are loose ribs—that is, they are only attached to the back. The remaining five spring from the backbone, take a backward direction at first, then turn at an angle of about 120 degrees, go forward and join the sternum. It is only with the two last ribs on either side—those nearest the thigh—we have to deal, and in the case of, say, an Orpington at 12 weeks old, the section attached to the backbone is about $1\frac{3}{4}$ in. long. The cut has to be made between the two last ribs from the backbone to the point where they turn to go forwards. The membrane which separates the thoracic from the abdominal section of the body is attached to the sixth rib, and therefore if the cut is made between the fifth and sixth ribs the lungs will be touched, and it will be next to impossible to take out the testicles. Cutting into the thoracic portion of the body, and even cutting the lung, does not often cause death, but as a second cut will be necessary on the same side great care should be taken to find the exact position at first.

Pass the first finger of the left hand, commencing at the thigh, towards the front of the bird until the seventh rib is reached, pass over this, pressing the nail between it and the sixth rib just about midway between the backbone and the angle of the ribs. Holding the finger firmly in position, the point of the knife—with the cutting edge towards the breastbone—is inserted to a depth of ½-in., and a cut made to the angle of the ribs. With the finger still in position, the knife is taken out, turned round with the cutting edge to

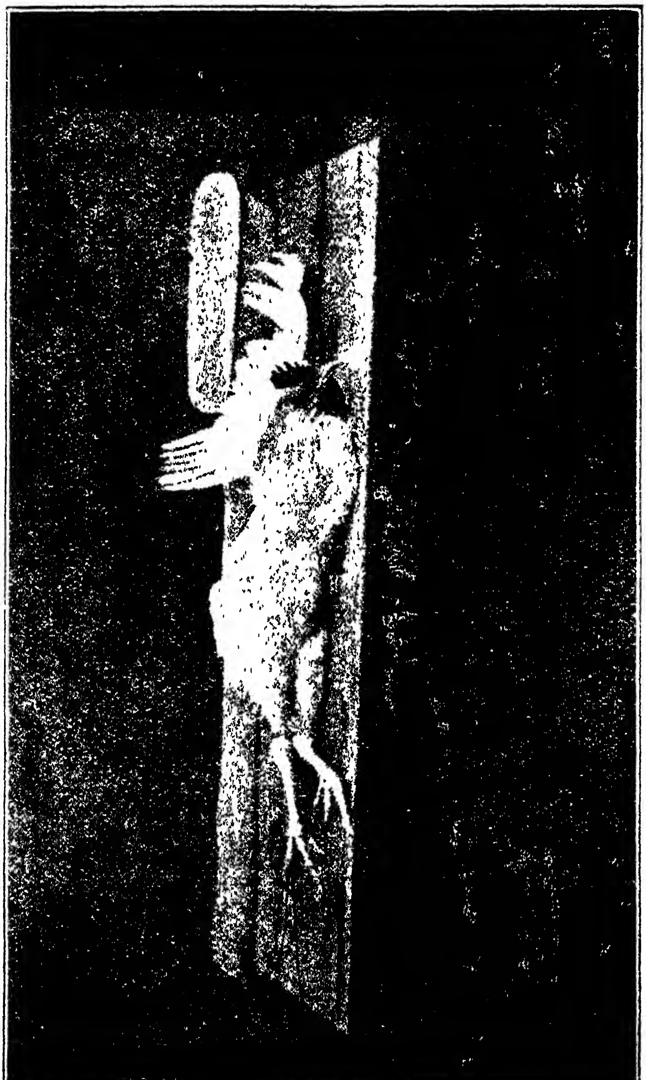


Fig. 2.—Showing bird in position with weights attached.

the back, re-inserted, and, removing the finger, the incision is continued with the knife vertically until the backbone is reached. The reason for holding the finger between the ribs during both cutting operations is that, the skin being loose, it may move and the cut be made in the wrong place. Figs. 4 and 5 show this part of the work.

The spreaders are next inserted, the seventh and sixth ribs being held in the two hooks of that instrument, as in Fig. 6. Surrounding the organs in the abdominal portion of the body is a fine membrane. It may happen, and

we generally succeed in doing it, that this membrane has been already severed by the first cutting; if not, the knife must be again used, but with caution, for it lies very close to the intestines. If there is sufficient blood in the body to make the organs indistinct, this should be soaked up by means of the sponges. In all probability, if the bird has been well starved, the right testicle will be in view. It is a small bean-shaped organ, yellow in colour, and is attached to the backbone. If not, by means of the forceps, the intestines should be pushed gently towards the breastbone, and this will bring it into

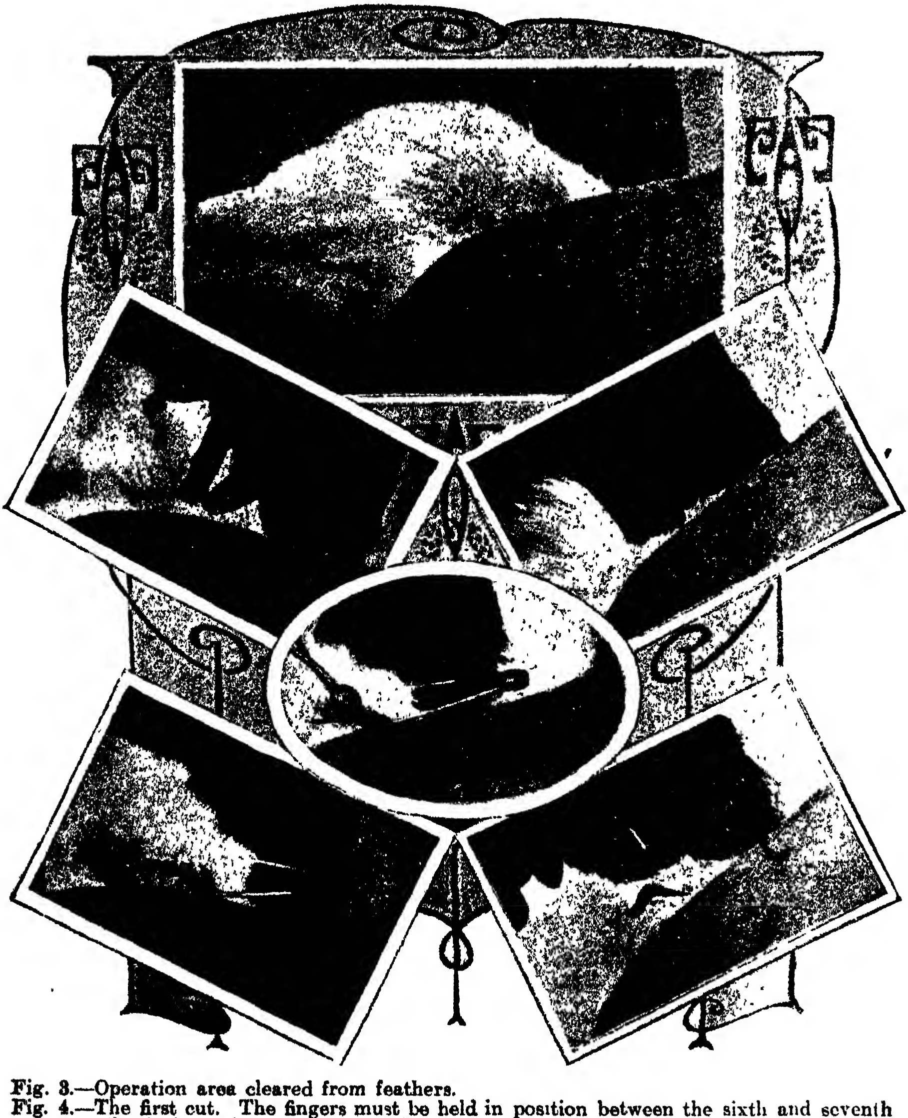


Fig. 3.—Operation area cleared from feathers.
Fig. 4.—The first cut. The fingers must be held in position between the sixth and seventh ribs during this part of the work.
Fig. 5.—The fingers still between the ribs, but the knife is here turned and ready for continuing the cut to the backbone. Note the knife must be held in a vertical position.
Fig. 6.—The spreaders holding the wound open so that the internal organs may be seen.
Fig. 7.—By means of the forceps the testicle is severed from the fastenings which connect it with the backbone and withdrawn.
Fig. 8.—As explained in the text, it is advisable for novices to put one stitch into the wound. The needle is passed through the skin on each side of the incision, and these are drawn together and tied.

view. Taking the forceps in the right hand, they should be inserted, slightly opened, with the ring blade towards the testicle, and a firm grip taken of that organ. With a half-turn the connection is severed, and the forceps with the testicle withdrawn, as shown by Fig. 7.

We have suggested that the cut in the first place should be made as large as the length of the ribs allow, and we believe it best for novices to do this, but it is advisable, after a few birds have been done, to make as small an incision as possible. With a large wound it is wise to put in one stitch to draw the skin together, and for this either a surgical or an ordinary needle, slightly curved, and white silk should be used. Only the skin must be sewn, for if the flesh covering the ribs be taken up the slightest movement of the fowl will tear it apart. Fig. 8. When sufficient practice enables the operator to work with a small opening, it is better not to stitch the skin at all. A gas is given off from the inside of the body, and if the wound heals too rapidly the bird will become puffed up, and to allow for the escape of the gas the skin will have to be pierced.

To take out the second testicle—the operation is repeated in a similar way on the other side of the body. As soon as the operation is over, the bird should be placed in a small coop littered out with clean straw. For a couple of days a small amount of food should be given five times a day. It is unwise to allow the bird to fill its digestive organs until the wound is partially healed. The best food we have found is soaked biscuit-meal, dried off with toppings or ground oats, with about 10 per cent. meat-meal added. After two days the bird can be given its liberty, but it is better if it is not allowed to perch for a few days longer. The birds recover very rapidly from this operation, and the death-rate is low. A proficient operator will not lose more than 2 per cent., and frequently a whole season will pass without any mortality at all. About five weeks before the Christmas demand commences the fowls should be picked up and fattened.

General Notes.

RHODES GRASS v. PASPALUM.

By THOMAS PURCELL, Dunmore Farm, Atherton.

Much has been said for and against the two grasses above mentioned in the local Press, and much more by the man in the street. Without in any way disparaging the undoubted worth of Paspalum, I think I may be permitted to cite the facts of my experience with both grasess. For comparison, I am taking figures and results that are verified by my books and accounts, and which extend over a period of three years. Perhaps I may make myself more explicit if I set my finding *seriatim*.

My tilling is at least as faithfully performed as any man's in the district, and I have spent over £150 in Paspalum seed, and am still buying and planting it. The areas respectively under Paspalum and Rhodes do not unduly favour either as regards growing conditions. My fodder acreage totals over 250 acres, and the ratio of stock feeding thereon is at present just a fraction more than one beast to the acre. Four years ago I planted some 90 acres, in the proportion of 1 Rhodes to 13 Paspalum. To-day these paddocks show, by the very meanest computation, three-fourths Rhodes, and at the rate of growing I should think that by this day twelve months it will be difficult to find a blade of Paspalum.

I am willing to admit the contention of dairymen who say that Rhodes, if shut up for ten or twelve months, makes bad feeding. In return, I will ask them to agree with me that Paspalum or Rhodes or any grass must be of rank growth if not fed off before it is ten or twelve months old.

Careful observation of a number of my paddocks has proved conclusively that I can always get an appreciable growth off Rhodes, either in winter or in a dry season, by spelling. The shoot in Pasplum at the same time was so little as to be hardly worthy of the name.

I find that Rhodes grass, by surface measurement, supplies three times as much fodder as Paspalum in dry weather.

I find that, allowing for difference in cream prices, &c., Rhodes grass gives me over 4s. per cow per month more than Paspalum.

I find that since extending my Rhodes grass acreage my silos have remained untouched for two years, and, as far as I can see, will remain untouched this year. In passing, I may mention that while depending on Paspalum my silos (240 tons) were continually working, and that my neighbours, who at the present time are feeding Paspalum, are always emptying theirs.

To the best of my knowledge all my experience of Rhodes bears out the report of Government Analyst Brünnich that Rhodes is, next to Lucerne, the best-balanced stock ration.

As a consequence, I am now putting in 80 acres of Rhodes grass out of 110 acres which I am laying down for fodder for the coming season.

I have no desire to argue the merits of either of the above grasses further than the citing of the facts of my own case; and I further trust that the people of this district at least, in discussing the fodder values, will only set down what they find—not what they may think.

TEN COMMANDMENTS OF DRY FARMING.

The Brisbane *Daily Mail* publishes the following:—

I. Thou shalt plough deep—

Lets rain get into soil easily. Lets in big rain without run off. Provides more feeding space for plant roots. More plant food made available.

II. Thou shalt keep the surface soil loose—

Keeps soil moisture from evaporating. Lets rain get into soil easily. More plant food made available, due to more moisture. Harrow the grain after it is up 2 in. or use weeder.

III. Thou shalt cultivate level—

Level soil has the least soil exposed to the air. More evaporation from a ridged soil. Level soil will take in rainfall much faster than ridged soil. On ridged soil the rain runs off through the furrows. The soil in the ridges dries out so that the plant has less moist surface soil to draw on for food and moisture. Ridging the soil is a most effective way for getting rid of both the moisture in the soil and of rainfall.

IV. That shalt summer fallow when rainfall is less than 15 in.—

The summer fallow saves up two years' rain for one crop. The summer fallow kills weeds and plant diseases. The summer fallow should be cultivated. When rainfall is over 15 in. corn will be as good a preparation for a crop as the bare fallow.

V. Thou shalt add organic matter to the soil—

Holds moisture and plant food. Improves mechanical condition of the soil. Helps make plant food available. Lessens drifting and blowing of the soil. Lessens washing of soil. Stable manure is the best form. Plough weeds under when green.

VI. Thou shalt keep down the weeds—

Weeds use up moisture. Weeds use up plant food. Weeds crowd the plants. Weeds shade the crops. Weeds make it difficult for the plants to grow. Weeds make it hard to work the land properly.

VII. Thou shalt grow early maturing crops—

Growing conditions best in early summer. Winter grains better than spring grains.

VIII. Thou shalt grow corn every three to five years—

The cultivation given corn saves moisture. The cultivation given corn kills weeds. The cultivation given corn kills plant diseases. Corn best preparation for a grain crop. Corn produces fine stock food, both grain and fodder. Corn produces more per acre than other crops. Do not hill up the corn, as this wastes the moisture.

IX. Thou shalt grow clover or alfalfa every few years—

Clover and alfalfa add fertility to the soil. Clover and alfalfa add organic matter to the soil. Clover and alfalfa kill weeds and plant diseases. Clover and alfalfa produce a most valuable hay. Clover and alfalfa produce very valuable seed crops.

X. Thou shalt keep stock—

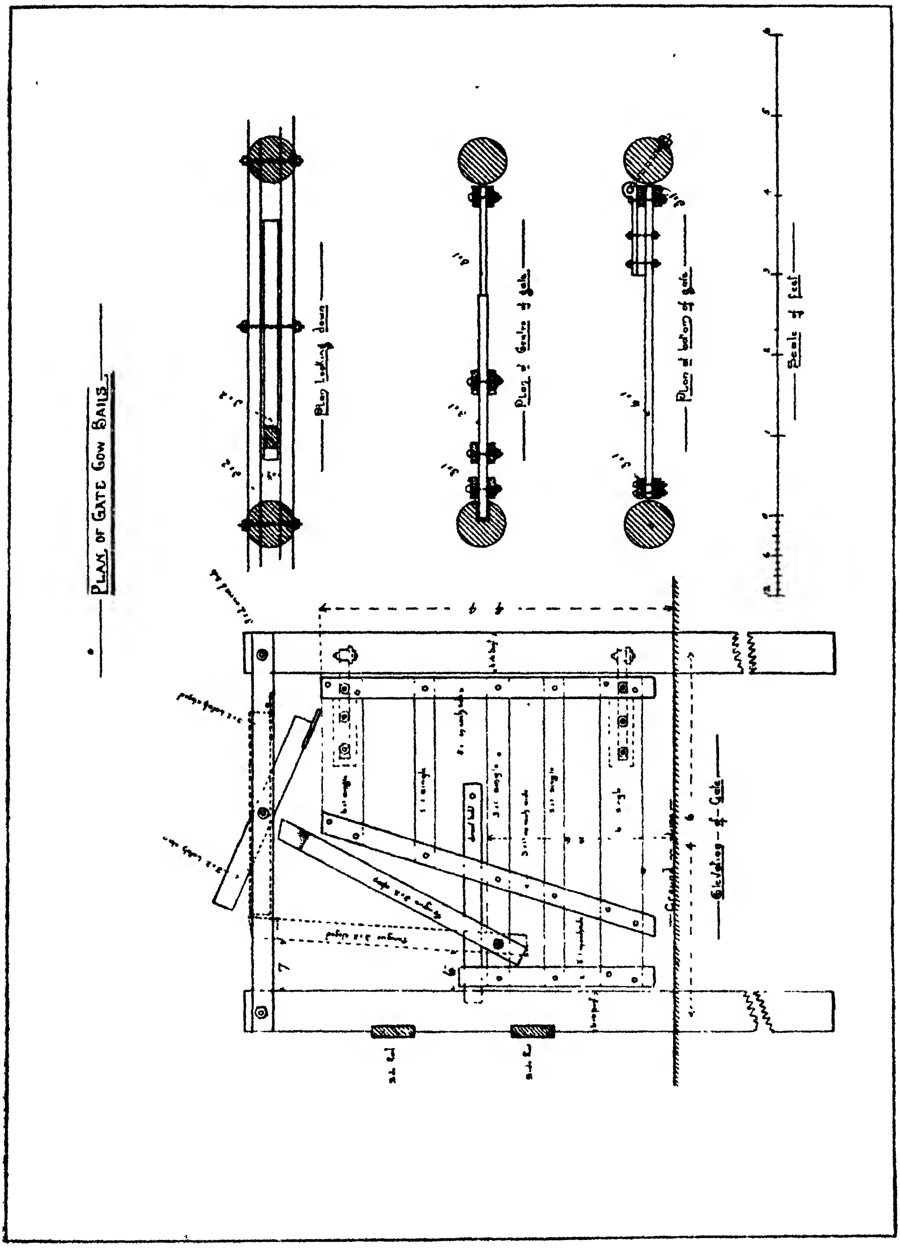
The most profitable way of marketing grain and fodder is through stock. They produce manure which is very necessary to the soil. They bring about prosperity.

Who obeys these commandments shall reap abundant crops. He who violates them shall be punished by decrease in yield in proportion to the transgression.—W. C. Palmer, Ag. Editor, Extension Dept., N.D. Agr. College.

COW BAIL AND GATE.

The description and sketch from which the accompanying drawing has been prepared was kindly supplied to the department by A. P. Myers, Esq., of Dalkeith, near Pittsworth. It illustrates a very simple and useful bail which is highly appreciated by those who have used it.

It is suitable for single or double stalls, and for hand or machine milking. The whole arrangement can be controlled from the back of the cow by cords, the animal simply walking forward when released by the opening of the gate.



Answers to Correspondents.

LOSS OF CALVES.

"INQUIRER," Wallan, Miles—

The loss of calves reported by you is most probably due to worms, notwithstanding your not having found any when making the *post-mortem* examination, as the symptoms described are such as would result from the presence of worms. Mr. A. H. Cory, Government Veterinary Surgeon, suggests your forwarding the lungs, stomach, and part of the bowels to the Experimental Farm, Yeerongpilly, for examination, when the next one dies.

We must draw your attention to your not having subscribed your name to your letter. Anonymous communications, as a rule, are not considered by the Department. In this case, your letter of 29th October can receive no reply until after the issue of the December number of the Journal, whereas had you signed it you would have had a prompt reply by letter, and a pamphlet dealing with the subject would have been sent you.

TREATMENT OF BULL—MUSCATEL GRAPES.

J. JENYNS, Bromelton—

Mr. A. H. Cory, Government Veterinary Surgeon, recommends that the sheath be bathed twice daily with hot water. Give also one of the following powders in the food twice daily or as a drench in a pint of cold water:—

Powdered nux vomica	1 drachm
Potassium iodide	1 drachm
Powdered gentian	3 drachms

As regards your grapes, Mr. C. Ross, Instructor in Fruit Culture, advises as follows:—Graft the Muscat on some of the Isabellas as a preventive of bursting. Stone or sapling drains, 3 feet deep, will do good in any land. Vinegar or sweet jelly may be made from green, undeveloped grapes.

TROUBLESOME MOSQUITOES.

"ANTI-MOSQUITO," Nudgee—

The Commissioner for Public Health, to whom your question was submitted, says that the following mixture rubbed on the hands and face will have the effect of keeping off mosquitoes:—

Citronella oil, 1½ parts; kerosene, 1 part; coconut oil, 2 parts; with 1 per cent. of carbolic acid added to the mixture.

When troubled with mosquitoes at Cooktown last year, we obtained a bottle of mixture from Mr. Sampson, local chemist. This mixture we still use, and it is an absolute preventive of mosquito bite.

CONTENT OF A DIP, ETC.

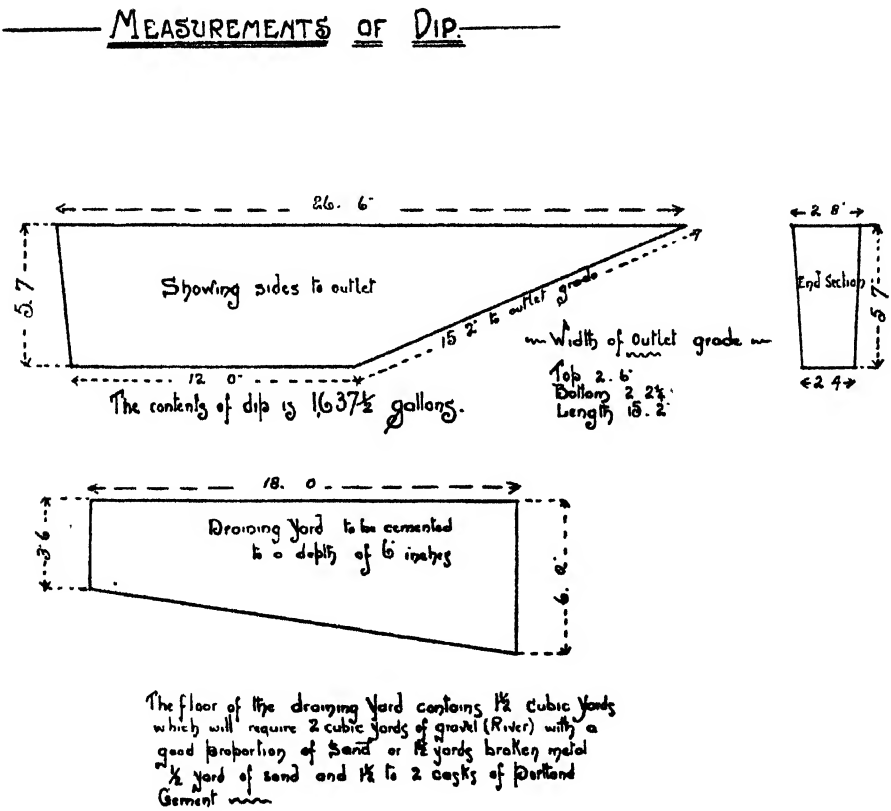
E. R. BROTHERTON, "Newlands"—

The content of the dip according to the diagram furnished by you is 1,637½ gallons.

The floor of the draining yard contains 1½ cubic yard, allowing for a depth of 6 inches of concrete or cement.

This will require 2 cubic yards of river gravel with a good proportion of sand; or, 1½ yard of broken metal, ½ yard of sand, and 1½ to 2 cases of Portland cement. The cost of this flooring would be between £4 and £5.

We give below the diagrams referred to.



The Markets.

PRICES OF FRUIT—TURBOT-STREET MARKETS.

Article.	NOVEMBER. Prices.
Apricots, per quarter-case	5s. 6d. to 7s. 6d.
Apples (Tasmanian), Eating, per case	5s. 6d. to 14s.
Apples (Cooking), per case	5s. 6d. to 10s.
Bananas (Cavendish), per dozen	2¼d. to 4½d.
Bananas (Sugar), per dozen	2d. to 2½d.
Cape Gooseberries, per case	...
Citrons, per cwt.	10s.
Cumquats, per quarter-case	1s. to 2s. 6d.
Lemons (Lisbon), per case	2s. 3d. to 6s.
Mandarins, per half-case	4s. to 6s. 6d.
Mangoes, per case	3s. 3d. to 4s. 3d.
Oranges (Local), per case	6s. to 10s.
Papaw Apples, per quarter-case	1s. to 2s.
Passion Fruit, per quarter-case	4s. 6d. to 5s. 6d.
Peanuts, per pound	2½d.
Peaches, per quarter-case	2s. 6d.
Pears (choice), per quarter-case	3s. 6d. to 5s.
Persimmons, per gin case	...
Pineapples (Ripley), per dozen	1s. to 4s.
Pineapples (Smooth), per dozen	1s. to 4s.
Pineapples (Rough), per dozen	9d. to 3s. 9d.
Rosellas, per sugar-bag	...
Strawberries, per tray	1s. 3d. to 3s.
Tomatoes, per quarter-case	1s. 6d. to 3s.

SOUTHERN FRUIT MARKET.

Article.	Prices.
Apples (Tasmanian), choice, per case	7s. to 10s.
Apples (Jonathan), per case	14s. to 15s. 6d.
Apples (Cooking), per case	2s. 6d. to 3s.
Apricots, per box	10s.
Bananas (S. Queensland), per bunch	2s. 6d. to 4s.
Bananas (S. Queensland), per case	12s. to 16s.
Bananas (N. Queensland), per bunch	2s. 6d. to 4s.
Bananas (N. Queensland), per case	15s. to 17s.
Bananas, G.M. (Fiji), per bunch	3s. 6d. to 4s. 6d.
Bananas, G.M. (Fiji), per case	10s. to 12s.
Cherries, per quarter-case	7s. 10d.
Cocoanuts, per dozen	2s. to 2s. 6d.
Lemons (Italian), per half-case	5s. to 5s. 6d.
Lemons (Local), per gin case	2s. 6d. to 3s. 6d.
Mandarins (Thorneys), choice, per half-case	3s. 6d. to 4s.
Mandarins (Queensland), Emperors, per gin case	9s. to 12s.
Mangoes (Queensland), per packer	6s. to 10s.
Oranges (Local), choice, Navels, per bushel case	7s. 6d. to 11s.
Oranges (S. Australian), per bushel case	6s. to 7s.
Papaw Apples (Queensland), per bushel case	3s. to 4s.
Passion Fruit (choice), per half-case	6s. to 9s.
Peaches (China), per half-case	5s. to 7s. 6d.
Peanuts, per lb.	5½d.
Pears (American), choice, per bushel case	12s. 6d. to 15s.
Pineapples (Queensland), Ripley, per case	5s. to 6s. 6d.
Pineapples (Queensland), common, per case	5s. to 6s. 6d.
Pineapples (Queensland), Queen's, per case	5s. to 6s. 6d.
Rock melons (Queensland), per double case	7s. to 8s.
Strawberries (Queensland), per dozen punnets*	4s. 6d. to 10s.
Tomatoes (Queensland), per quarter-case	5s. to 6s.

* A punnet is a shallow basket containing 1 quart.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR NOVEMBER.

Article.		NOVEMBER. Prices.
Bacon, Pineapple	lb.	8d. to 9½d.
Barley, Malting	bush.	3s. 6d.
Bran	ton	£4 17s. 6d.
Butter, Factory	lb.	8d. to 10d.
Chaff, Mixed	cwt.	2s. to 3s. 6d.
Chaff, Oaten	"	2s. to 3s. 6d.
Chaff, Oaten (Victorian, imported)	"	4s 6d. to 5s. 3d.
Chaff, Lucerne	"	3s. 9d. to 4s.
Chaff, Wheaten	"	...
Cheese	lb.	5¾d. to 6¼d.
Flour	ton	£8 15s.
Hay, Oaten	"	£2 to £2 10s.
Hay, Lucerne	"	2s. to 2s. 6d.
Honey	lb.	2d. to 2½d.
Maize	bush.	2s. 4d.
Oats	"	3s. 2d. to 3s. 3d.
Pollard	ton	£4 12s. 6d.
Potatoes	"	£7 to £9
Potatoes, Sweet	cwt.	1s. 4d. to 1s. 6d.
Pumpkins	"	5s. 6d.
Wheat, Milling	bush.	3s. 9d.
Onions	ton	£4 10s. to £5
Hams	lb.	1s. 1d. to 1s. 1½d.
Eggs	doz.	7d. to 8d.
Fowls	pair	3s. 6d. to 4s. 9d.
Geese	"	6s. 9d. to 7s. 6d.
Ducks, English	"	3s. 6d. to 4s. 6d.
Ducks, Muscovy	"	4s. 6d. to 5s. 3d.
Turkeys (Hens)	"	7s. 6d. to 8s. 9d.
Turkeys (Gobblers)	"	14s. to 18s. 6d.

TOP PRICES, ENOGGERA YARDS, OCTOBER, 1910.

Animal.	OCTOBER. Prices.
Bullocks	£9 to £10 7s. 6d.
Ditto (single)	£12
Cows	£7 10s. to £8 12s. 6d
Ditto (single)	£9 15s.
Merino Wethers	19s. 6d.
Crossbred Wethers	20s.
Merino Ewes	15s. 6d.
Crossbred Ewes	11s. 3d.
Lambs	15s. 3d.

Farm and Garden Notes for January.

FIELD.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish Blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole.

KITCHEN GARDEN.—A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in a covered seed bed, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflowers, mustard, cabbage, celery, radish, for Autumn and Winter use. Sow celery in shallow, well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

FLOWER GARDEN.—To make the flower beds gay and attractive during the Autumn and Winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotten leaves. Fill the boxes with the compost, then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle lift them gently one by one with a knife or a zinc label—*never pull them up by hand*, as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty

of leaf mould. Then keep a sharp lookout for slugs and caterpillars. Keep a supply of tobacco dust on hand, and scatter this in the path of the slug, and he will cease from troubling you.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to over water at this season. Propagate verbenas, not forgetting to include the large scarlet Fox-hunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed boxes, mulch, shade, water, and kerosine spray, all of which imply a certain amount of morning and evening work. The flower garden in Autumn and Winter will present a charming sight, and will afford light and profitable work for girls with spare time on their hands.

An exhaustive booklet on "Flower Gardening for Amateurs" has been issued by the Department of Agriculture and Stock, and may be obtained from the Office. Price, 2s.

Orchard Notes for January.

THE SOUTHERN COAST DISTRICTS.

The fruit of the month in this part of the State is the grape, and its gathering and marketing will occupy the attention of growers. Care should be taken to cut the fruit when cool and dry, and if it has to be sent any distance the stems of the bunches should be allowed to wilt before the fruit is packed, as the berries will then hang on to the bunch better, and the bunch carry in better order. Select the fruit carefully, grade it, and pack firmly so that it will not bruise in transit. If to be sent long distances, pack in crates holding from four to six 6-lb. baskets. Pines will be ripening in quantity towards the end of the month. Gather before fully coloured, and, whether for Southern or local markets, pack and handle carefully to prevent bruising. Do not ship the fruit too green for the Southern markets, as doing so is apt to spoil the trade. Send good fruit to the canneries. Small pines and crippled fruit are no good to canners, and the sooner our growers realise that it only pays to grow good fruit the better for them and for the canners, as if the latter cannot get good fruit it is impossible for them to put a line of goods that will not only be a credit to the State, but for which a world-wide market can be obtained.

Passion fruit should not be allowed to lie about for days on the ground before gathering, as if so they are apt to become fly-infested.

Watermelons and rock melons are still in season.

Watch any late peaches, Japanese plums, or other fruits liable to be infested with fruit fly, and gather and destroy all infested fruit, or, better still, grub the trees out and burn them, as they only breed flies to destroy more valuable fruit. Mangoes will be ripening during the month. See that all fly-infested fruits are destroyed, as they will only breed up further crops to destroy later ripening fruits.

Citrus orchards can be cyanided during the month for scale insects, and spraying for Maori with the sulphide of soda wash should be continued where necessary.

Mangoes can be budded during the month, as well as citrus and deciduous trees. Tropical fruit trees can be transplanted, taking care to choose dull weather and to cover same from the direct rays of the sun till they have become firmly established. Pines and bananas can still be planted

TROPICAL COAST DISTRICTS.

See that all bananas are covered with netting, as the fly is usually at its worst at this time of year.

Mangoes will be going off. See that they are not allowed to remain about on the ground to breed flies for the Autumn crop of oranges. Longan, litchi, and other fruit are in season. As the month is often a very wet one, little cultivation can be done in the orchards. Strong undergrowth should, however, be kept down with a hoe or scythe. Tropical fruits of all sorts can be planted. Look out for Maori on citrus fruits, and spray when necessary.

SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Stanthorpe district, apples, pears, plums, peaches, and nectarines being in season. Do not gather the fruit too immature; at the same time, don't allow it to be over-ripe. Gather dry, handle carefully, grade and pack in attractive cases. Keep the fruit as cool as possible, and ship in well-ventilated cars. Keep a sharp lookout for fruit fly, and take every possible means to prevent its spreading, even going as far as to gather and destroy the whole of the fruit on any infected trees, as if kept in check during the month the bulk of the fruit ripening during February will be free.

Keep a sharp look out also for codling moth, examine the bandages on the trees at least every ten days, and destroy all larvæ found therein; also gather and destroy all moth-infected fruit.

Gather Bartlett pears as soon as they are large enough, and store away in a cool shed to ripen; when they show signs of ripening, market, not before. If sent down green they will sell for cooking, and only fetch a small price. The right stage at which to gather is when the fruit is fully developed, and the flesh has lost its woody flavour, but is still quite hard. This is usually before the fly has stung it, and if gathered at this stage the fruit will ripen up properly without shrivelling, and develop its full flavour.

These remarks apply also to the Downs country, which is somewhat earlier than Stanthorpe.

The crop of the month in the Western tablelands is the grape; and the remarks I have made respecting this fruit when grown in the Southern Coast districts apply equally here. The fruit should be gathered dry, and wilted before it is packed. Too large cases are often used; cases holding from 20 to 30 lb., or crates holding six 6-lb. baskets, are preferable, the latter being the best package for shipping the fruit long distances. Keep the orchards well cultivated, and, where water for irrigation is available, give citrus trees a watering during the month, unless there has been a sufficient rainfall. When the orchard is irrigated, see that thorough cultivation follows the irrigation, so as to conserve the moisture in the soil.

Red Scale, which is prevalent on citrus trees in the dry Western country, should be treated during the month. Cyaniding is the best remedy.